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# INDIANA UNIVERSITY STUDIES



Study No. 28

MADAME D'ARBLAY'S PLACE IN THE DEVELOPMENT  
OF THE ENGLISH NOVEL. By WILL TALIAFERRO HALE,  
Ph.D., Department of English, Indiana University.





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# Madame D'Arblay's Place in the Development of the English Novel

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Department of English, Indiana University.

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## I. INTRODUCTION

The object of this study is to define Madame D'Arblay's place in the development of the English novel. Altho much has been written concerning the life of this brilliant woman, there has been no thorogoining treatment of her novels. *Evelina* and *Cecilia*, it is true, have received a certain amount of examination, and the more obvious traits have been indicated; but the critics have dismissed *Camilla* with a few cursory references, and have barely mentioned *The Wanderer*. In this investigation, which comprises a detailed study of the four novels, the attempt is made not only to point out the general characteristics, but to trace the progress of their development. In particular, the aim has been to determine the nature of the long neglected *Camilla* and *The Wanderer*, and show why they were never readable.

Madame D'Arblay, better known by her maiden name of Frances (or Fanny) Burney, was born at Kings Lynn, Norfolk, in 1752. When eight years old, she moved to London, and there, while her father, Dr. Charles Burney, gave music lessons and filled social engagements, she acquired what education she could pick up at home. At ten she began scribbling stories, and had completed a novel before she was fifteen; but on account of the opposition of her stepmother, she burned all her manuscripts, and did not venture to offer a work to the public until her twenty-seventh year. This masterpiece, *The History of Evelina* (1778), which the great Dodsley refused to publish, had at once a phenomenal success. It ran thru four editions, and won for its young author the friendship of Burke, Reynolds, and Johnson. In 1782, she published her second novel, *Cecilia*, the first edition of which, consisting of two thousand copies, was sold in three months.

The brightest literary career now lay before her, but under the influence of her father, who had an undue appreciation of royalty,

she accepted the appointment of second keeper of the robes to Queen Charlotte, and for the next five years (1786-91) consumed all her energies in the menial duties of a lady's maid. When at length this service had undermined her health, the queen reluctantly permitted her to retire on a pension of a hundred pounds a year. With this meager income as her only support, in 1793 she married General D'Arblay, a penniless refugee from France. Three years later, in order to meet her household expenses, which the birth of a son made more pressing, she published *Camilla* (1796) by subscription. Four thousand copies were sold, and it was rumored that she cleared three thousand guineas.<sup>1</sup> After a sojourn in Paris, where for ten years she was cut off from England by the Napoleonic wars (1802-12), she wrote her last novel, *The Wanderer* (1814), and disposed of 3,600 copies at two guineas each. During the remaining twenty-eight years of her life, her only literary employment was the publication of her father's *Memoirs* (1832). She died in 1840 at the age of eighty-seven.

## II. STYLE

To the scholar the most interesting quality in Madame D'Arblay's works is the style. In all English literature there exists no parallel to the fantastic evolution that it rapidly underwent. It is really incredible how the author of *Evelina*, except in her dotage, could have written *Camilla* or *The Wanderer*. The first has a style that is natural, simple, and charming; the latter are written, as Macaulay says, in "the worst style that has ever been known among men".<sup>2</sup> In making this characterization of the later novels, Macaulay thus accounts for their failure: "When she wrote her letters to Mr. Crisp, her early journals, and her first novel, her style was not indeed brilliant or energetic; but it was easy, clear, and free from all offensive faults. . . . In an evil hour the author of *Evelina* took *The Rambler* for her model. . . . She had her own style. It was a tolerably good one; and might, without any violent change, have been improved into a very good one. She determined to throw it away, and adopt a style in which she could attain excellence only by achieving an almost miraculous victory over nature and over habit. She could cease to be Fanny Burney; it was not so easy to become Samuel Johnson. In *Cecilia* the change of manner began to appear. But in *Cecilia* the imitation of Johnson, though not always in the best taste, is sometimes eminently happy; and the passages which are so verbose as to

<sup>1</sup> Cf. *Select Essays of Macaulay* (ed. Thurber), 163.

<sup>2</sup> *Ibid.*, 117.



be positively offensive are few. . . . When next Madame D'Arblay appeared before the world as a writer, she was in a very different situation. She would not content herself with the simple English in which *Evelina* had been written. . . . The consequence was, that in *Camilla* every passage which she meant to be fine is detestable. . . . But there was to be a still deeper descent. After the publication of *Camilla*, Madame D'Arblay had resided ten years at Paris. . . . Madame D'Arblay had carried a bad style to France. She brought back a style which we are really at a loss to describe. It is a sort of broken Johnsonese, a barbarous *patois*, bearing the same relation to the language of *Rasselas* which the gibberish of the negroes of Jamaica bears to the English of the House of Lords. . . . It matters not what ideas are clothed in such a style. The genius of Shakespeare and Bacon united would not save a work so written from general derision."<sup>3</sup>

Macaulay does not stretch his point. As far as the style is concerned, this is a fair and exact criticism, but a restatement must be made in regard to the influence of Dr. Johnson. The imitation of his writings was, without question, the strongest influence in the deterioration of Madame D'Arblay's style;<sup>4</sup> but this imitation did not begin, as Macaulay declares, with the composition of *Cecilia*. There are unmistakable traces of it thruout *Evelina*.<sup>5</sup>

The general characteristics of Johnson's style are, first, a pompous diction; second, a turgid, verbose form of expression; third, an antithetic, balanced sentence structure. The following passages from *Rasselas* and *The Rambler* illustrate these qualities:

"I remembered that my father had obliged me to the improvement of my stock, not by a promise, which I ought not to violate, but by a penalty, which I was at a liberty to incur; and therefore determined to gratify my predominant desire, and, by drinking at the fountain of knowledge, to quench the thirst of curiosity."<sup>6</sup>

The great remedy which heaven has put in our hands is patience, by which though we cannot lessen the torments of the body, we can in great measure preserve the peace of the mind.<sup>7</sup>

These traits are at once apparent in the later novels. In the first place, there is the pompous diction that characterizes *Rasselas* and

<sup>3</sup> *Select Essays of Macaulay* (ed. Thurber), 171 ff.

<sup>4</sup> Other causes assigned are the influence of the French during Madame D'Arblay's ten years in France; imitation of Dr. Burney's writings; pride on account of her former position at court; and the practice of composing blank verse. Cf. Austin Dobson, *Frances Burney*, 188 ff.

<sup>5</sup> Austin Dobson (*op. cit.*, 82, 127) expresses a similar view.

<sup>6</sup> *Rasselas*, chap. viii.

<sup>7</sup> *The Rambler* (Lit. Club edit.), I, 208.

*The Rambler*. At the very beginning of *Cecilia* one notes the "big words". In *Camilla* the tendency is still more pronounced:

"The delicacy of your highly cultivated mind awes even the passion which you inspire."<sup>8</sup>

Thruout *The Wanderer* this trait invariably appears:

"And has our atmosphere, Elinor, no purifying particles, that in defiance of its occasional mists, render it salubrious?"<sup>9</sup>

In the second place, the later style is turgid and verbose. A casual glance thru *Cecilia* shows the simplest statements expressed with an inflated circumlocution:

Yet her natural benevolence, which partial convenience never lulled to sleep, impressing her with an apprehension that her services might be wanted, she was induced to write to Miss Belfield, though she forbore to visit her.<sup>10</sup>

The same trait appears in *The Wanderer* in a more exaggerated form:

"How shall I ever endure myself again, should Miss Ellis withdraw her kind promise of communication, in resentment of an acquiescence in quitting her, for which already I begin almost to disdain myself?"<sup>11</sup>

In the third place, the later style abounds in balance, or contrast. Words set against words, or clauses against clauses, the contrast is far-fetched, and strikes the reader as a fantastic conceit.<sup>12</sup> These extracts show its nature:

"Ill-usage," answered he, "is as hard to relate as to be endured. . . . Those who give the offence, by the worthy few may be hated, but those who receive it, by the world at large will be despised."<sup>13</sup>

Thither, immediately everybody flocked, with as much speed and avidity as if they had learnt to appreciate the blessing of plenty, by the experience of want.<sup>14</sup>

Harleigh reluctantly, yet instantly desisted; but the pleasure of so unhoped a reception still beat at his heart, though it no longer sparkled in her eyes: and though the enchanting animation of her manner, was altered into the most repressing gravity, the blushes which still tingled, still dyed her cheeks, betrayed that all within was not chilled, however all without might seem cold.<sup>15</sup>

These are the chief Johnsonian characteristics in Madame D'Arblay's later novels. That each of these qualities is well defined

<sup>8</sup> *Camilla*, I, 272.

<sup>9</sup> *The Wanderer*, I, 17.

<sup>10</sup> *Cecilia*, I, 232.

<sup>11</sup> *The Wanderer*, IV, 25.

<sup>12</sup> Sometimes the balance itself is artificial, as when a phrase, subordinate to another, is so placed as to appear antithetic to it (cf. second illustration).

<sup>13</sup> *Cecilia*, II, 200.

<sup>14</sup> *Camilla*, I, 214.

<sup>15</sup> *The Wanderer*, II, 346.

in *Evelina* may easily be shown. The following passage occurs in the Preface:

To avoid what is common, without adopting what is unnatural, must limit the ambition of the vulgar herd of authors: however zealous, therefore, my veneration of the great writers I have mentioned, however I may feel myself enlightened by the knowledge of Johnson,<sup>16</sup> charmed with the eloquence of Rousseau, softened by the pathetic powers of Richardson, and exhilarated by the wit of Fielding, and humour of Smollet; I yet presume not to attempt pursuing the same ground which they have tracked; whence, though they may have cleared the weeds, they have also culled the flowers, and though they have rendered the path plain, they have left it barren.<sup>17</sup>

We see at once the pompous diction, the verbose form of expression, and the balanced style. A comparison of these characteristics with the illustrations from the later works will show that *in kind*, at least, these are identical with the Johnsonian qualities there exhibited. These characteristics, however, are not confined to the Preface of *Evelina*, but instances of the same kind occur thruout the book. The Reverend Mr. Villars frequently speaks in this Johnsonese:

"Yes, my child, thy happiness is engraved, in golden characters, upon the tablets of my heart! And their impression is indelible, for should the rude and deep searching hand of misfortune attempt to pluck them from their repository, the fleeting fabric of life would give way, and in tearing from my vitals the nourishment by which they are supported, she would but grasp at a shadow insensible to her touch."<sup>18</sup>

Even the unsophisticated *Evelina* does not always refrain from this high-flown language. In comparing the immaculate Lord Orville with his less glorious sister, she indulges in this reflection:

How can that young lady see her brother so universally admired for his manners and deportment, and yet be so universally opposite in *her's*! but while *his* mind, enlarged and noble, rises superior to the little prejudices of rank, *her's*, feeble and unsteady, sinks beneath their influence.<sup>19</sup>

These extracts show conclusively that Johnson's influence upon Madame D'Arblay had already begun when she wrote *Evelina*. It is true that the Johnsonian characteristics first obtrude themselves upon our attention in *Cecilia*, but a careful examination of the previous novel shows that these qualities, tho undeveloped, were inherent in her style from the beginning. If, therefore, her deterioration was due to Dr. Johnson, it began with the first pages of her first novel,

<sup>16</sup> Note this reference to Johnson, which is very significant in connection with the question under discussion.

<sup>17</sup> Cf. also the Dedication to *Evelina*.

<sup>18</sup> *Evelina*, II, 274-75; cf. also II, 147.

<sup>19</sup> *Ibid.*, II, 119.



and *Cecilia* marks not the beginning, but an advanced stage of his influence. Aside from the internal evidence that supports this theory, we know that long before Madame D'Arblay began to write *Evelina*, she had read *Rasselas* and had enjoyed and admired the style. Her *Diary* for July 17, 1768, contains this statement:

I have lately read the Prince of Abyssinia—I am almost equally charm'd and shocked at it—the style, the sentiments are inimitable.<sup>20</sup>

Two other characteristics of the later style show their beginnings in *Evelina*. The first, a fantastic, highly metaphorical form of expression, occurs thus in *Camilla*:

"Edgar," said Mr. Tyrold, "you have a look to disarm care of its corrosion."<sup>21</sup>

In *The Wanderer* this belated euphuism<sup>22</sup> appears in all its glory. The author, wishing to make a simple statement concerning one of her characters, utters this rhapsody:

Gabriella embraced, with pungent affliction, the sorrowing Juliet . . . and by the assistance of the angelic beings already hinted at, whose delicacy, whose feeling, whose respect for misfortune, made their beneficence as balsamic to sensibility as it was salutary to want, returned to the capital.<sup>23</sup>

Macaulay cites this instances from the *Memoirs of Dr. Burney*:

He was assaulted, during his precipitated return, by the rudest fierceness of wintry elemental strife; through which, with bad accommodations and innumerable accidents, he became a prey to the merciless pangs of the acutest spasmodic rheumatism, which barely suffered him to reach his home, ere, long and piteously, it confined him, a tortured prisoner, to his bed.<sup>24</sup>

This strange variety of flowery rhetoric abounds in *Camilla* and *The Wanderer*, but traces of it can be detected in *Evelina*, as quoted above:

I yet presume not to attempt pursuing the same ground which they have tracked; whence, though they may have cleared the weeds, they have also culled the flowers, and though they have rendered the path plain, they have left it barren.<sup>25</sup>

<sup>20</sup> *Early Diary of Frances Burney* (ed. A. R. Ellis), I, 14. The *Diary* (to 1779) shows no distinguishable traces of Dr. Johnson's influence; but this may be due to the fact that, being a diary, it was written with a less premeditated, more unconscious art than the novel.

In the preface of *Evelina* (cf. above, p. 9), Madame D'Arblay mentions Johnson's name, showing that at the time of its composition *Rasselas* occupied an important place in her mind.

<sup>21</sup> *Camilla*, IV, 68.

<sup>22</sup> Euphuism, so called from Lyly's *Euphues*, was an affected literary style of considerable vogue during the latter part of the sixteenth century. It consisted of an exaggerated use of alliteration, antithesis, consonance, etc. Cf. *Select Essays of Macaulay* (ed. Thurber), 177.

<sup>23</sup> *The Wanderer*, III, 49.

<sup>24</sup> *Select Essays of Macaulay* (ed. Thurber), 175.

<sup>25</sup> *Evelina*, Preface. Cf. II, 147, 274.

We need not go far to seek the source of this fantastic distortion of the English speech, for Dr. Burney, Madame D'Arblay's father, wrote in just this way. In one of his letters to her, he says:

Why, my dear F. B. d'Arblay! what a happy effect has the kindness of your dear, accomplished, and elegant friend, Mrs. Locke, produced! She has poured balm into all your mortal wounds, and healed every sore, which having no leonine tincture of March in it, now only breathes zephyrs, and the comforts of Favonius.<sup>26</sup>

On another occasion, he writes thus in regard to a friend's death:

It has been very well said of mental wounds, that they must digest, like those of the body, before they can be healed. The poultice of necessity can alone, perhaps, in some cases, bring on this digestion; but we should not impede it by caustics or corrosions. Let the wound be open a due time—but not be kept bare with violence.<sup>27</sup>

Without question, Madame D'Arblay inherited this vagary from her father, and eventually fell a victim to its use thru the influence of his writings.

Another quality, a highly colored sentimentality, strongly characterizes the later novels. The emotion is raised to the nth power. Nothing is done in a normal way. Every one who moves, moves "precipitately".<sup>28</sup> A stern countenance appears as "a brow of almost petrifying severity";<sup>29</sup> a haughty look becomes either "a mien of such rigid austerity"<sup>30</sup> or a "heightened air of haughty disdain";<sup>31</sup> a bright future is converted into "sweet balsamic hopes".<sup>32</sup> The heroine agonizes "in deep distress; every ray of hope was chased away from her prospects",<sup>33</sup> or she was "touched, penetrated, and distressed beyond what she had been in any former time".<sup>34</sup> The hero was "wounded to the heart by the recital",<sup>35</sup> or was "stung to the heart to see who handed her away".<sup>36</sup> A meeting with the hero has this effect upon the heroine:

. . . so livid a paleness overspread her face, and so deadly a cold seemed to chill her blood, that, but for a friendly burst of tears, which ensued, her vital powers appeared to be threatened with immediate suspension.<sup>37</sup>

<sup>26</sup> *Memoirs of Dr. Burney*, III, 419.

<sup>27</sup> *Ibid.*, II, 320.

<sup>28</sup> *The Wanderer*, IV, 1.

<sup>29</sup> *Ibid.*, IV, 3.

<sup>30</sup> *Ibid.*, IV, 6.

<sup>31</sup> *Ibid.*, IV, 2.

<sup>32</sup> *Ibid.*, IV, 11.

<sup>33</sup> *Camilla*, II, 350.

<sup>34</sup> *Ibid.*, III, 449.

<sup>35</sup> *Ibid.*, II, 352.

<sup>36</sup> *Camilla*, IV, 368.

<sup>37</sup> *The Wanderer*, I, 441.

Language of this kind abounds in *Camilla*:

To Miss Camilla Tyrold:

An incident has happened that over-powers me with sadness and horror. I cannot write. O! come and pass an hour or two at Cleves with your distressed  
Eugenia.<sup>38</sup>

Altho the diction in *Evelina* has not reached the emotional proportions of these works, unmistakable beginnings of the later sentimentality are evident. The scene in which Evelina's father acknowledges her<sup>39</sup> is a prototype of the agonizings that occupy so much space in *Camilla* and *The Wanderer*. A subsequent meeting between the two anticipates those tearful episodes that fill the last two novels:

Tears and sighs seemed to choke him. . . .

I could not speak; I kissed his hand on my knee: and then, with yet more emotion, he again blessed me, and hurried out of the room,—leaving me almost drowned in tears. . . .

When I was sufficiently composed to return to the parlour, I found Lord Orville waiting for me with the utmost anxiety:—and then a new scene of emotion, though of a different nature, awaited me. . . .<sup>40</sup>

The trend of this sentimentalizing is obvious. It indicates the first stage of the evolution toward the tears of *Camilla*, the rant of Elinor, and the convulsions of the fair Incognita. In *Cecilia*, which represents the second stage, Mortimer Delville makes love to the heroine after this doleful fashion:

"Angelic creature!" cried Delville, his own tears overflowing. . . .

"Ah, Delville!" cried she, a little reviving. . . .

"Too kind, too feeling Delville!" cried the penetrated Cecilia. . . .

"Oh, words of transport and extacy!" cried the enraptured Delville, "oh, partner of my life! friend, solace, darling of my bosom! that so lately I thought expiring! that I folded to my bleeding heart in the agony of eternal separation!"<sup>41</sup>

Madam D'Arblay's tendency to write in this way was due to the influence of the sentimental school of fiction, represented by *The Man of Feeling* and similar works. The chief source of her emotion was Richardson;<sup>42</sup> but in the expression of it, she follows closely the manner of Mackenzie, who published his novel seven years before *Evelina* appeared. A few extracts from it will show its superabundance of sentiment. Harley, the hero, visited Bedlam, and his friend gave the keeper some money for the inmates:

<sup>38</sup> *Camilla*, III, 94.

<sup>39</sup> *Evelina*, II, 232.

<sup>40</sup> *Evelina*, II, 250. Cf. also 246 ff.

<sup>41</sup> *Cecilia*, II, 458.

<sup>42</sup> See below, p. 31.



Harley stood fixed in astonishment and pity! his friend gave money to the keeper. . . . He put a couple of guineas into the man's hand: "Be kind to that unfortunate"—He burst into tears and left them. . . .<sup>43</sup>

On another occasion:

His resolution failed; he shrunk back, and locking the gate as softly as he could, stood on tiptoe looking over the wall till they were gone. At that instant a shepherd blew his horn: the romantic melancholy of the sound quite overcame him!—it was the very note that wanted to be touched—he sighed! dropped a tear!—and returned. . . .<sup>44</sup>

Finally, when he had languished a good many days and was dying of love unspoken, Miss Walton, the lady in the case, came to see him and frankly acknowledged her affection:

He seized her hand—a languid color reddened his cheek—a smile brightened faintly in his eye. As he gazed on her, it grew dim, it fixed, it closed—He sighed, and fell back on his seat—Miss Walton screamed at the sight—His aunt and the servants rushed into the room—They found them lying motionless together—His physician happened to call at that instant. Every art was tried to recover them—with Miss Walton they succeeded—But Harley was gone forever.<sup>45</sup>

Undoubtedly some such influence as Mackenzie's sentimentalism had begun to affect Madame D'Arblay when she wrote *Evelina*. The sentimentalizing in *Cecilia* is still more pronounced, and in the last two novels it appears with no restraint whatever. If we note the rapid development that this propensity attains in the four years between the publication of the first two novels, and then recall that fourteen years pass before *Camilla* appears, and eighteen more before *The Wanderer*,<sup>46</sup> it seems a certainty that this characteristic of the later style grew directly out of the earlier. An author's faults usually become more pronounced as he advances in age, unless the development of his critical faculty counteracts them. Madame D'Arblay, however, seems not only to have had no critical faculty, but to have lacked entirely a sense of humor, which alone would have saved her from so wild a vagary.

<sup>43</sup> *The Man of Feeling*, 38.

<sup>44</sup> *Ibid.*, 133.

<sup>45</sup> *Ibid.*, 152.

<sup>46</sup> *Evelina* was published in 1778; *Cecilia*, 1782; *Camilla*, 1796; *The Wanderer*, 1814.

## III. DIALOGUE

The keeping of a diary was a salutary influence in the development of Madame D'Arblay's style. The naïveté and freshness with which she set down the events of her daily life and the conversation of those around her appear in the more vivid passages of *Evelina* and *Cecilia*. These lines from the *Diary* ring true to life and seem remarkably of the present day:

Our confab was interrupted by the entrance of Mr. King.

The joke is, the people speak as if they were afraid of me, instead of my being afraid of them.<sup>47</sup>

Professor Burton says, "No one who has been admitted to the privilege of Miss Burney's Diary can fail to feel that a woman who commands such idiom is easily an adept in the realistic dialogue of the novel." Mr. Elton makes a similar statement: "Her fictitious dialogues have the same air of veracity, of line-by-line reproduction, as her record of her talks with royalty or with the unspeakable old court dame Schwellenberg."<sup>48</sup>

These judgments are but partially true. They apply only to certain parts of *Evelina*, to fewer of *Cecilia*, and to almost none of *Camilla* and *The Wanderer*. As far as the speech of her characters is concerned, Madame D'Arblay cannot be compared with so consummate an artist as William De Morgan; but she is significant in the history of the novel on account of the attention she paid to dialogue, for before her there had been practically no differentiation of characters by their speech. For this she deserves praise; but, just as in the differentiation of her characters she has produced humors, so in their speech she has introduced a good deal of caricature. Each of them talks in the same way all the time. Those of the upper-class, as a rule, converse in a stilted, affected way that lessens very much the illusion of reality.<sup>49</sup> But the second-class characters are always more natural, and in reporting their speech, Madame D'Arblay shows great skill. The Branghtons and Mr. Smith, of the first novel, talk more like human beings than anybody else in the author's works. She displays her power nowhere better than in the altercation at the box-office when the Branghtons take *Evelina* to the opera:

<sup>47</sup> Cf. Richard Burton, *Masters of the English Novel*, 99.

<sup>48</sup> Oliver Elton, *A Survey of English Literature*, I, 177.

<sup>49</sup> It must be conceded that some of this unnaturalness is undoubtedly due to the way such people talked in the last half of the eighteenth century. And yet, when all allowance has been made for the artificial state of society at that time and the changes that have occurred in speech since then, it still seems that these novels go beyond what was the usage even then.

In a short time, however, we arrived at one of the door-keepers' bars. Mr. Branghton demanded for what part of the house they took money. They answered the pit, and regarded us all with great earnestness. The son then advancing, said, "Sir, if you please, I beg that I may treat Miss."

"We'll settle that another time," answered Mr. Branghton, and put down a guinea.

Two tickets of admission were given to him.

Mr. Branghton, in his turn, now stared at the doorkeeper, and demanded what he meant by giving him only two tickets for a guinea?

"Only two, Sir!" said the man, "why don't you know that the tickets are half-a-guinea each?"

"Half-a-guinea each!" repeated Mr. Branghton, "why I never heard of such a thing in my life! and pray, Sir, how many will they admit?"

"Just as usual, Sir, one person each."

"But one person for half-a-guinea!—why I only want to sit in the pit, friend."

"Had not the Ladies better sit in the gallery, Sir, for they'll hardly choose to go into the pit with their hats on?"

"O, as to that," cried Miss Branghton, "if our hats are too high, we'll take them off when we get in. I sha'n't mind it, for I did my hair on purpose."<sup>50</sup>

The small talk, when they eventually find themselves in the top gallery, seems remarkably lifelike. Captain Mirvan's and Madame Duval's exchange of pleasantries, also, have a high degree of reality. The exemplary Lord Orville, however, who chooses his words with the obvious effort of making a good appearance, does not always speak naturally:

"The bath amusements," said Lord Orville, "have a sameness in them, which, after a short time, renders them rather insipid: but the greatest objection that can be made to the place, is the encouragement it gives to gamesters."<sup>51</sup>

A little less starch in the speech of this immaculate young man would not be amiss.

The increased artificiality of the dialogue in *Cecilia* coincides with the general falling-off in naturalness. The characters make the simplest statements in the form of set speeches; for example, Mr. Monckton introduces the heroine to his friends in this way:

"I bring you a subject of sorrow in a young lady, who never gave disturbance to her friends but in quitting them."<sup>52</sup>

<sup>50</sup> *Evelina*, I, 104.

<sup>51</sup> *Ibid.*, II, 262.

<sup>52</sup> *Cecilia*, I, 68.



Mortimer Delville makes his proposal of marriage in the form of a carefully prepared declamation:

"Ever-lovely Miss Beverly," cried he, more seriously, "why this resentment? why all this causeless distress? has not my heart long since been known to you? have you not witnessed its sufferings, and been assured of its tenderness? Why, then, this untimely reserve? this unabating coldness? Oh why try to rob me of the felicity you have inadvertently given me! and to sour the happiness of a moment that recompenses such exquisite misery!"<sup>53</sup>

As in the previous novel, the more natural speeches are spoken by the middle-class characters, especially the lower-middle-class, to which Mr. Hobson belongs. Lady Honoria, however, is sometimes very natural in her sprightliness; but, in general, the conversations are of too great length, and everyone says too much. No one stops to breathe. In life nobody could be induced to listen so long. As Macaulay has pointed out, everyone harps on the same string on all occasions: "Mr. Delville never opens his lips without some allusion to his own birth and station; or Mr. Briggs, without some allusion to the hoarding of money; or Mr. Hobson, without betraying the self-indulgence and self-importance of a purse-proud upstart; or Mr. Simkins, without uttering some sneaking remark for the purpose of currying favor with his customers; or Mr. Meadows, without expressing apathy and weariness of life; or Mr. Albany, without declaiming about the vices of the rich and the misery of the poor; or Mrs. Belfield, without some indelicate eulogy on her son; or Lady Margaret, without indicating jealousy of her husband. Morrice is all skipping, officious impertinence, Mr. Gosport all sarcasm, Lady Honoria all lively prattle, Miss Larolles all silly prattle."<sup>54</sup>

The excessive artificiality of *Camilla* obliterates any naturalness that the speeches might have had. Even Dr. Johnson laid aside his Johnsonese when he talked; in five volumes, even Henry Mackenzie's lachrymose sentimentality would have sometimes relaxed itself. These characters, however, never forget themselves. Melmond thus enjoys the *Seasons*:

"I am in a scene that entrances me to Elysium!"<sup>55</sup>

When he deserts his fiancée, she makes this announcement to her sister:

"All is over, my sister, and over for life with Eugenia! Melmond flies and detests me! I am odious in his sight! I am a horror to his thoughts!"<sup>56</sup>

<sup>53</sup> *Cecilia*, II, 90.

<sup>54</sup> *Select Essays of Macaulay* (ed. Thurber), 170.

<sup>55</sup> *Camilla*, II, 90.

<sup>56</sup> *Ibid.*, V, 67.

*The Wanderer* has no real speech.<sup>57</sup> Most of the book is rant. Page after page reeks with sentimental twaddle. Elinor, whose convulsions never end, utters this apostrophe on emerging from a fit:

"Do I awake, then, from agony and death—agony, impossible to support! death, willing and welcome!"<sup>58</sup>

Later, convinced that she is dying, she cries:

"The struggle is over!—and I shall quaff no more this nauseous draught of life."<sup>59</sup>

Even when they have no audience, these people will not dispense with this jargon. Harleigh, tho all by himself, chants this dithyramb:

"Charming, charming creature! what can have cast thee into this forlorn condition! And by what means—and by whom—art thou to be rescued?"<sup>60</sup>

Not satisfied with this inflated speech, these eloquent personages will speak of themselves or address each other in the third person.<sup>61</sup> Their conversations run interminably, occupying frequently from twenty-five to forty pages.<sup>62</sup>

#### IV. HUMOR

The humor enlivens the dialogue in the first two novels. Even here, however, it is not of the highest order, but is nearly always abnormal. Madame D'Arblay shows a keen sense of the ridiculous, but it is somewhat crude. Predominantly farcical and elephantine, her humor consists for the most part of horseplay. It has little of that delicate, charming fancy with which Lamb brightens up the most commonplace subjects, and it has none of the sparkle of De Quincey's more brilliant wit. It is not of Miss Austen's esoteric type: a wayfaring man, tho a fool, cannot miss its point. It lies less in character than situation. It resembles the more exaggerated comedy in *Pickwick Papers*, and yet it is devoid of Dickens' kindness of heart. Altho it has none of the biting, caustic tone of Swift, it lacks the gentle, childlike spirit that runs thru everything Goldsmith's Vicar says.

*Evelina*, beyond a doubt, has more humor than the other novels, and yet a good deal of it cannot rank above horseplay. Captain Mirvan and Madame Duval, who furnish much fun of this kind, on

<sup>57</sup> The old admiral and Mr. Tedman now and then say something with a genuine flavor (cf. II, 124, 161, 163; V, 358 ff., 377, 383 ff.).

<sup>58</sup> *The Wanderer*, I, 422.

<sup>59</sup> *Ibid.*, II, 435.

<sup>60</sup> *Ibid.*, I, 278. Cf. *Camilla*, II, 331.

<sup>61</sup> Cf. *The Wanderer*, I, 407, 427; V, 364.

<sup>62</sup> Cf. *Camilla*, II, 222 ff., 289 ff., 355 ff.; *The Wanderer*, II, 252 ff.

their first meeting start a fight which continues unabated thruout the book. They never mince matters, but plainly and vulgarly express their minds to each other. They are fashioned after the pattern of Smollett's roughs and bullies,<sup>63</sup> yet, like these worthies, they amuse us in a broad way. Shameful as is the trick which the Captain and Sir Clement play upon Madame Duval, it has a certain element of humor. The old woman, lying in the ditch, all spattered with mud, her feet tied and her battered curls ruined forever, makes a ludicrous picture.<sup>64</sup> Upon an equally high plane is the humor of the Captain's ecstasy when Monsieur Du Bois and this lady trip in the mud—it ends more like a cat-fight than anything human.<sup>65</sup> The joke with the monkey, in which the unfortunate Lovel plays so sad a part, likewise goes too far—nothing could go too far against Lovel—but it is too far-fetched.<sup>66</sup> If this is fun, it is of the cheapest kind. In this instance and some of her other humorous efforts, Madame D'Arblay displays a noteworthy lack of feeling. Her heart seems absolutely hardened in contriving the diabolical expedients of the Captain; but the most heartless, unpardonable effort is her attempt to extract humor from the misery of the two poor old women who are compelled to run a race.<sup>67</sup>

All the humor, however, does not depend upon horseplay. *Evelina's* inexperience and naïveté delight us. Here the touches are lighter than anywhere else in the book. This young lady of seventeen lays bare her heart with much charm as she attempts "to describe the world as it seems to a woman utterly preoccupied with the thought of how she seems to the world".<sup>68</sup> But her view of the world around her would have been more humorous as well as more interesting could her delineator have taken less seriously her conflict with the proprieties, and have considered some of her embarrassing situations with the detached attitude of Miss Austen.<sup>69</sup> The Branghtons and their lodger, Mr. Smith, who furnish humor of a more genuine type than the cruel, premeditated jokes of Captain Mirvan, are the most amusing people in the book, and in their ingenuousness make an immediate appeal to our sense of the ridiculous. The comedy seldom sinks into farce. The Misses Branghton are always admirable: nothing could be more delightful than their bourgeois simplicity, in spite of their assumption of knowingness. This short colloquy, simple

<sup>63</sup> See the passage from the Preface of *Evelina* (page 9 above), in which the author speaks of "the humor of Smollett".

<sup>64</sup> *Evelina*, I, 164 ff.

<sup>65</sup> *Ibid.*, I, 72 ff.

<sup>66</sup> *Ibid.*, II, 268 ff.

<sup>67</sup> *Ibid.*, II, 152 ff.

<sup>68</sup> Walter Ralieggh, *The English Novel*, 252.

<sup>69</sup> *Ibid.*, 258.



as it is, reveals a higher quality of humor than the elaborate pitched battles between their aunt and the Captain:

"Lord, Polly, only think! Miss never saw her papa!"

"Lord, how odd!" cried the other, "why then, Miss, I suppose you wouldn't know him?"<sup>70</sup>

This is humor of the first class—humor based on the inconsequential workings of the human mind. And this shows what Madame D'Arblay might have done, had she developed her genius in this direction, instead of deliberately cultivating affectation and sentimentality. Mr. Branghton's attempt to buy opera tickets has already been given.<sup>71</sup> The talk when, at last, they have reached their seats at the top of the house, rings true to life; especially Mr. Branghton's, "I find it as arrant a take-in as I ever met with",<sup>72</sup> and his son's "I never knew father so bit before."<sup>73</sup> During the performance they make comments in a similar vein. Mr. Smith deserves special notice on account of his efforts to hide his ignorance, which, as when he mistakes Neptune for a general, display a high degree of humor. His self-assurance is inimitable.

The humor of *Cecilia*, which is heavier and more forced than that of *Evelina*, lacks its predecessor's spontaneity, and depends to a greater extent upon caricature and horseplay. Altho nothing corresponds to the violence of Captain Mirvan and Madame Duval, none of the characters equal the Branghtons. Buffoonery takes the place of comedy. Morrice, upon whose antics the amusement of several situations depends, is nothing but a harlequin. His skill in capturing the chair beside Cecilia by leaping over it just at the moment Mr. Monckton is about to sit in it,<sup>74</sup> would be more in place in a circus ring than a novel of manners. The same can be said of his disastrous attempt to jump over the table of refreshments at the masquerade, and the subsequent beating which he received at the hands of Mr. Monckton.<sup>75</sup> Mr. Brigg's parsimony transcends belief; otherwise it would amuse us. His reprimand to the maid who has beaten two feathers out of the mattress, charging her with extravagance, is incredible.<sup>76</sup> His indignation at Cecilia's refusal of his hospitality is even more absurd:

<sup>70</sup> *Evelina*, I, 78.

<sup>71</sup> Cf. above, page 15.

<sup>72</sup> *Evelina*, I, 106.

<sup>73</sup> *Ibid.*, I, 107.

<sup>74</sup> *Cecilia*, I, 80.

<sup>75</sup> *Ibid.*, I, 120 ff.

<sup>76</sup> *Cecilia*, I, 364.

"Didn't, didn't!" he answered, angrily; "waited for you three days, dressed a breast o' mutton o' purpose; got a lobster, and two crabs; all spoilt by keeping; stink already; weather quite muggy, forced to souse 'em in vinegar; one expense brings on another; never begin the like again."<sup>77</sup>

In the scene, however, where he nearly goes mad over her gift to Albany,<sup>78</sup> and in the several encounters which he has with the pompous Mr. Delvile, we find some genuine comedy. Mr. Hobson provides the most thoroly natural humor, for he acts more like a human being than any of the others. The most interesting as well as the most humorous situation in the whole book is that really impossible scene in which he, Albany, Briggs, and Delvile are brought face to face. Nothing could be more exquisite than the surprise and indignation of Mr. Delvile at Hobson's coupling him and Briggs in the naïve proposal that "one of these gentlemen take t'other by the hand".<sup>79</sup>

No humor brightens the pages of *Camilla* and *The Wanderer*. They are both tearful books, and they maintain this character consistently from the beginning of volume *one* to the conclusion of volume *five*. It must not be supposed, however, that Madame D'Arblay does not attempt to produce humor. Her frantic attempts are only too obvious. Dr. Orkborne and Mr. Dubster, who represent the more successful of these efforts, are pathetic rather than humorous. Orkborne is an impossible philologist, whose distinguishing traits are lack of common sense and absent-mindedness—but we expect even a philologist to be rational. Dubster would have succeeded as a sort of inferior clown, had the author not turned him into an absolute fool. Yet even in this dreary waste, now and then we detect a glimmer of her early power; as when speaking of a marriage between Dr. Orkborne and Miss Margland, Sir Hugh remarks:

"However, if they would marry one another, I can't but say I should take it very well of them. The only thing I know against it, is the mortal dislike they have to one another."<sup>80</sup>

In spite of its greater tearfulness, *The Wanderer* has more attempts at humor than *Camilla*, but it succeeds even less. Mr. Giles Arbe, whose first word of greeting on entering a room is "Goodbye",<sup>81</sup> shows how attenuated the author's idea of the humorous has become. He is really demented, but she considers him amusing. Caught tampering with a parcel on the heroine's mantel, he says in apology:

<sup>77</sup> *Cecilia*, I, 440.

<sup>78</sup> *Ibid.*, II, 286.

<sup>79</sup> *Ibid.*, II, 293.

<sup>80</sup> *Camilla*, V, 545.

<sup>81</sup> *The Wanderer*, II, 222.

"I beg your pardon a thousand times! I don't well know how this happened; but the chimney-piece looks so like my own,—and the fire was so comfortable,—that I suppose I thought I was at home, and took that parcel for one that the servant had put there for me. And I was wondering to myself when I had ordered all those linens and muslins, and the like: I could not recollect one article of them."<sup>82</sup>

Mr. Tedman and the Admiral furnish a mild degree of amusement at times, and in one of the latter's remarks we catch the last flicker of the author's vanished genius:

"Not that I would condemn a dead man, who cannot speak in his own defence, for I hold nothing to be narrower than that."<sup>83</sup>

### V. PATHOS

To amuse the reader is only a secondary consideration in these novels. It would seem that Madame D'Arblay's prime object is to develop his sympathetic powers, for with an ingenuity relentless and untiring, she invents torture after torture for her long-suffering heroines. This wanton cruelty appears even in *Evelina*. As Sir Walter Raleigh says: "Social miseries, in all their intensity and variety, surely never had a more enthusiastic recorder. The tortures Evelina suffers have the vividness of a nightmare."<sup>84</sup> Most of the book describes the trials and tribulations of this unsophisticated young heroine. In addition, we have the sentimental Macartney, with his liberal quota of griefs. In the second novel, the tortures increase. Not only the three guardians and the throng of lovers, but every character in the book lends a hand in tormenting the young heiress. A glance at the headings of some of the chapters will show what a thrilling time she had—and how natural was her delirium in the latter part of the story: chapter i, "A Wrangling"; chapter ii, "A Suspicion"; chapter iii, "A Disturbance"; chapter iv, "A Calm"; chapter v, "An Alarm"; chapter vi, "A Suspense"; chapter vii, "A Relation"; chapter viii, "An Enterprize".<sup>85</sup>

*Camilla* has even more turmoil. Everybody takes a turn on the rack. At the beginning of volume one, Eugenia has her shoulder "put out" and her knee dislocated. Besides, she catches the smallpox. Not long after, Sir Hugh lies at the point of death. Soon Camilla's love for Edgar begins, and its agonies extend thru the five volumes. In the meantime Lynmere comes home, disdains Eugenia, irritates

<sup>82</sup> *The Wanderer*, II, 209.

<sup>83</sup> *Ibid.*, V, 383.

<sup>84</sup> *The English Novel*, 258.

<sup>85</sup> From the Table of Contents (vol. II, book IX).



Sir Hugh, and disgusts everybody. Then Bellamy runs off with Eugenia and compels her to marry him. About this time Lionel gets into disgrace, puts his sister into serious difficulties, and has to leave the country. Camilla falls into the toils of a money-lender, and her father has to go to jail. Indiana wrenches Melmond's heart and runs away with Macderfy. Camilla repulses Sir Sedley Clarendel, and he retires from the story to recover his equanimity. Mrs. Berlington assuages her grief with Hammond's *Elegies* and one of Collins's "most plaintive odes". Thus everybody is miserable from start to finish. The last novel, however, goes beyond this. Beginning with a wail from the unknown heroine, during its five volumes the cry of anguish knows no respite. Harassed by Mrs. Maple, browbeaten by Mrs. Ireton, cowed by Mrs. Howel, catechized by Miss Bydel, cheated by Miss Arbe, terrified by Elinor, loved by Harleigh, snubbed and insulted by everyone, and, finally seized by her villainous husband, the fair young creature passes from one agony into another. Besides all this, we endure those wild spells of Elinor's, with the hysterics and the thwarted suicides—and Gabriella, like Rachel and Niobe, weeping at all hours. For never a page does the torment lull.

More tearful and tragic, if possible, than these situations is the language in which they are depicted. Even *Evelina* has many emotional passages and sentimental scenes of this type,<sup>86</sup> but, strange to say, in reading we are hardly conscious of them. This is due to the fact that to an inexperienced girl of seventeen like *Evelina*, highly colored and overemphasized emotions seem only natural. Indeed, a great deal of her charm comes from the undue way in which she is affected by ordinary circumstances. The case of *Cecilia* and the other novels is a different matter. Since the author, and not the young heroine, is telling these stories, the very expressions that charm us in the mouth of a seventeen-year-old girl seem affected and overdone. We take it for granted that an author will restrain her feelings somewhat; we expect her to have more poise than a girl in her teens. In the last novels, however, we find neither reserve nor restraint, but a diction elevated above anything conceivably human. Two passages will illustrate this. The first, which is taken from *Camilla*, is the author's own:

Mrs. Berlington was left prostrated nearly as much as her brother, and doubtful if even the divine Indiana could render him as happy as the exalted, the incomparable Eugenia.<sup>87</sup>

<sup>86</sup> Cf. C. F. Horne, *The Technique of the Novel*, 199, where the opposite view is maintained.

<sup>87</sup> *Camilla*, V, 134.

The other, from *The Wanderer*, shows how the characters often talk to each other:

"Harleigh! dearest Harleigh! you are master of my soul! You are sovereign of my esteem, my admiration, my every feeling of tenderness, and every idea of perfection!—accept then the warm homage of a glowing heart, that beats for you; and that, beating in vain, will beat no more." . . .

[Harleigh on one kneel: "Elinor! you crown me, then, with honours, but to kill me with torture."<sup>88</sup>

These passages clearly reveal why, altho many pages are moist with tears, there is a dearth of genuine pathos.

We find a few exceptions to these "ambitious scenes of distress".<sup>89</sup> In two or three instances Madame D'Arblay has shown that she can depict with much tenderness scenes that are really pathetic. Mrs. Hill tells her simple story of her husband's illness and Billy's death with sincerity, and with no hint of sentimentality or theatricality.<sup>90</sup> The scene in which Edgar leaves Camilla to go on his foreign tour has a high degree of restraint,<sup>91</sup> and her parting from her uncle when he expects to die shows considerable reserve:

"Is my Uncle well enough to speak?" cried Camilla, softly opening the door, "and may I—for one single moment,—see him?" . . .

"That's the voice of my dear Camilla!" said Sir Hugh; "Come in, my little love, for I sha'n't shock your tender heart now, for I am going to get better."

Camilla, in an extacy, was instantly at his bed-side, passionately exclaiming, "My dear, dear uncle! will you indeed recover?"

\* \* \* \* \*

Tears flowed fast down the cheeks of Mr. Tyrold, as he uttered whatever he could suggest most tenderly soothing to his Brother: and the young mourners, not daring to resist, were all gliding away, except Camilla, whose hand was fast grasped in that of her uncle.

"Ah, my Camilla," cried he, as she would gently have withdrawn it, "how shall I part with my little dear darling? This is the worst twitch to me of all, with all my contentedness! And the more because I know you love your poor old uncle, just as well as if he had left you all he was worth, though you won't get one penny by his death!"

"O my dear, dearest Uncle—" exclaimed Camilla, in a passionate flood of tears; when Mr. Tyrold, assuring them both the consequences might be fatal, tore her away from the bed and the room.<sup>92</sup>

<sup>88</sup> *The Wanderer*, I, 400.

<sup>89</sup> *Select Essays of Macaulay* (ed. Thurber), 171.

<sup>90</sup> *Cecilia*, I, 83.

<sup>91</sup> *Camilla*, V, 34 ff.

<sup>92</sup> *Ibid*, II, 423, 431 ff.

## VI. CHARACTERIZATION

We wish that Madame D'Arblay had been content to write in this simple manner; but, as we have seen, the chief fault of all her work is exaggeration and lack of reserve. These blemishes appear particularly in her characterization, where the overemphasis takes the form of caricature. The first novel offends less in this respect than the others. The seventeen-year-old Evelina, portrayed in a vivid, lifelike way, makes a strong human appeal, and is the greatest triumph of the author's genius. Cecilia's outlines do not seem so clear, yet she is almost the counterpart of her predecessor. Indeed, in making these heroines practically identical, Madame D'Arblay has confused the individualities of both. Camilla and *The Wanderer* are only later editions, third and fourth avatars, as it were. In the case of each heroine the environment constitutes the variant, and yet, altho the environment of each differs externally, it is essentially the same. Each of them is exposed to annoyances and dangers, and at each moment of her career is harassed by someone who makes a sudden, inopportune appearance. Under these trials, they have the same scruples and hesitations and questionings of conscience, and they all act alike. They are paragons, and all the men fall in love with them.<sup>93</sup> Young and unsophisticated, they are general targets for the community; but at the end, they all come off triumphant and settle down in matrimonial bliss. Apart from the heroine, the most humorous characters in the first novel are Miss Branghton and Mr. Smith. Miss Branghton would be immortalized by one expression, if she had kept her peace forever afterwards:

"Lord, Polly, only think! Miss has danced with a Lord!"<sup>94</sup>

She shows as genuine naïveté when her brother is trying to discover Sir Clement Willoughby's line of business:

"Pray, Miss," said young Branghton, in the same breath, "what's his business?"

"Indeed I don't know," answered I.

"Something very genteel, I dare say," added Miss Branghton, "because he dresses so fine."<sup>94A</sup>

She always rises to the occasion. Mr. Smith's assurance has already been alluded to. Madame Duval and Captain Mirvan are carefully drawn, and are caricatures only in their more violent moods. Lord Orville, however, like the rest of the author's heroes, Mortimer Delville,

<sup>93</sup> Camilla is somewhat of an exception in this respect, for she has to share the honors (i.e. the lovers) with Eugenia and Indiana. However, she has Edgar, Sir Sedley, Dubster, *et al.*

<sup>94</sup> *Evelina*, II, 68.

<sup>94A</sup> *Ibid.*, II, 21.



Edgar Mandelbert, and Mr. Harleigh, is not very human. They are all exemplary young men,<sup>95</sup> but they have no individuality or initiative. We certainly cannot visualize them. Mr. Macartney, too, leaves no impression upon us. Sir Clement and Lovel belong to the conventional types of the beau and the bore combined, which with slight alterations occur in all of these novels.

In the second story we find the tendency to caricature fully developed. We encounter a number of skilfully drawn personages, but as Mr. Elton says, "there is more mind in the work, but less nature".<sup>96</sup> Macaulay takes the same position in his *Essay*, and shows that Madame D'Arblay has created "humors" rather than characters. But it must be conceded that she has shown great ability in the portrayal of these "humors". And Macaulay is right when he says, "Nevertheless, a writer may show as much genius in the exhibition of these humors as to be fairly entitled to a distinguished and permanent rank among classics."<sup>96A</sup> Professor Raleigh is hardly fair in declaring that "Cecilia's three guardians . . . carry no conviction of reality and exhibit no credentials", tho his statement is sound that "the fops, witlings, and jargonists are mere types, the products of a busy comic wit that has lost its way".<sup>97</sup> These characters are exaggerated, beyond a doubt, but they make a strong impression upon us. We cannot deny, as Macaulay has pointed out, that each after his kind talks in the same manner on all occasions; but each has a distinct individuality. They are caricatures; but we know exactly the kind of people they are, and to a limited extent we know them. Mr. Delville, Mr. Briggs, Mr. Hobson, and Mr. Albany are certainly "four old fools",<sup>98</sup> but they are clearly individualized old fools, and create the impression of human beings. Mr. Hobson is the most real character in the book. Mrs. Belfield's maternal bias seems hardly overdone. The construction of Mrs. Delville, in spite of Daddy Crisp's criticism,<sup>99</sup> shows skilful work. Madame D'Arblay deserves credit for having differentiated with clearcut lines so exceedingly large a number of characters. As Professor Cross states, "*Cecilia* is the best caricature we have of English society just before the French Revolution."<sup>100</sup>

In *Camilla* and *The Wanderer* the caricature shows marked

<sup>95</sup> Harleigh, for instance, is said to have declared "he never meant should he marry, to be tender to his wife before company" (*The Wanderer*, I, 195).

<sup>96</sup> *A Survey of English Literature*, 177.

<sup>96A</sup> *Select Essays of Macaulay* (ed. Thurber), 169.

<sup>97</sup> *The English Novel*, 259.

<sup>98</sup> *Select Essays of Macaulay* (ed. Thurber), 171.

<sup>99</sup> *Cecilia*, III, 222 ff. (footnote).

<sup>100</sup> *Development of the English Novel*, 95.

deterioration. These volumes teem with characters, but most of them lack vividness, and many of them we recognize as duplicates of our old acquaintances in the previous novels. In the former Sir Hugh stands out most prominently, and in spite of his eccentricities, approaches closest to life. Eugenia, tho possessed of as little discretion as Camilla, makes a more distinct impression; and Lionel, while coaxing his sister into borrowing for him, becomes remarkably human. But Dr. Orkborne is only a cartoon, Sir Sedley only a type, and Dubster only the outline of a fool. In the last novel we see but the glimmer of the author's departing power. Four women stand out prominently—Mrs. Maple, Mrs. Ireton, Mrs. Howel, and Miss Arbe, but their distinctness is due only to their unmitigated meanness. Madame D'Arblay seldom does her best work with her guileless characters. Of the men, Lord Melbury leaves the most permanent impression, but only the old Admiral and Mr. Tedman talk at all like human beings.

Evidently, therefore, Madame D'Arblay cannot rank with the greatest creators of characters. She has portrayed a remarkable number of types, and has skilfully differentiated them, but they do not impress us as human beings. We remember them distinctly, we can describe their dispositions, but we do not know them. We know about them. One cause of our inability to visualize them is that she seldom informs us as to their appearance, either their features or their clothes. In this she differs fundamentally from Dickens and Thackeray, whose people we recognize in everyday life, because we know exactly how they look. She devotes her energies to giving us the gradations of their emotions or exhibiting the eccentricities of their conduct and speech, and we become acquainted with them only thru the exaggeration and reiteration of these eccentricities.

It is not the continual harping on one trait, however, that distorts these characters out of all human proportions, but the unnatural exaggeration. Madam D'Arblay has made too many freaks. These little more than monomanics might have been human and rational had she felt any sympathy for them, but except in the case of her scrupulous heroines she shows very little regard for her characters. She never loves them as Dickens did his. Altho not cynical, she seems to have had a bitter attitude towards life, for the majority of her men and women are detestable. They are not only mean and cruel and utterly indifferent to everyone else's feelings, but they take a fiendish delight in making other people miserable. Most of Evelina's distress would have been averted had the young beaux she encountered had any feeling at all. This heartlessness increases with

each of the later novels. Cecilia is the recipient of attacks from everyone. The agony and mortification which Eugenia suffers on account of her lameness and scarred face transcend belief. In *The Wanderer*, where the whole world seems depraved, hardly a character has any manners or any heart. No one hesitates to discuss the Incognita to her face, and this attack from Mrs. Ireton is a fair sample of the insults she received at everyone's hands:

"So!" she cried, "you are still here? Pray,—if I may ask so confidential a question,—what acquaintance may you have found in this inn? The waiters or the grooms?"<sup>101</sup>

This conception of wanton depravity caricatures human nature just as much as any of the portraits of the eccentric characters. But this is not the only respect in which the characterization reflects upon humanity: the moral code of these people is largely a matter of decorum and propriety. Etiquette serves in lieu of a conscience. "It is true," says Jeaffreson, speaking of the author of *Evelina*, "she did not depict painful scenes of sensuality, but she never has (with all her moral pointing) any higher standard by which to measure an act, or thought, than that of social propriety; 'the vulgar' was that which moved her bitterest contempt, and 'the genteel' was that on which she expended her warmest admiration; and she was one of the first of those novelists (of whom Theodore Hook was the greatest) who earned a degrading popularity by pouring ridicule, such as a wealthy and well-fed menial hurls at a less fortunate companion in servitude, on the manners and habits of the class in which their fathers and mothers, and they themselves, were born and bred."<sup>102</sup> This is a strong statement, but after all has been said, it remains true that the characters talk and act very much as if they had been reared on the *Letters of Lord Chesterfield*.

A chief flaw in the characterization is the lack of development. *Evelina* may know more at the end of her experiences, but her mind has not progressed at all. The rest fare no better, the bad remaining bad, the good, good, and the fools, foolish—in the same degree as when they began. While the child plays but a small part in these novels, here and there one casually appears, who generally belongs to the peasant or laboring class; but never, as they grow up, do these children reveal the growth and development of their intellects.

Madame D'Arblay, however, does not fail to show us the minds of her characters. *Evelina*, with a charming naïveté, opens her heart to us, and in the other books the analyses of the motives suggest George

<sup>101</sup> *The Wanderer*, I, 21.

<sup>102</sup> J. Cordy Jeaffreson, *Novels and Novelists*, 338.



Eliot's psychologizing. Like Richardson's Pamela and Clarissa, these heroines constantly hesitate, and worry over questions of deportment and conscience, and indulge in the most elaborate reasonings before taking a step. The analysis, however, is not as skilful or thoroging as George Eliot's.<sup>103</sup> Utterly devoid of humor and never convincing, it is a weary business. It never stimulates us intellectually like Meredith's, or amuses us like Thackeray's. It is flimsy, for the simple reason that the characters have no brains to be analyzed. Besides, Madame D'Arblay looks upon the reason as a simple, and not a complex thing, and consequently deduces motives that carry little conviction. Her characters have no backbone. Their mental processes seem more like apologies for their senseless behavior than explanations of their real motives. This, more than anything else, causes the weakness of her plots. The motivation depends upon whimsicalities that are inexplicable. Cecilia's pretexts for lending Harrel her money, for going over and over again to Mrs. Belfield's, and for getting into all those embarrassing situations, have no justification. No good and sufficient reason is given for Camilla and Edgar's estrangement, and Eugenia's loyalty to Bellamy borders on the idiotic. The Wanderer deserves all the tribulations that come to her, on account of her purposeless behavior. Her scruples and decisions have so little sense behind them that we lose all patience with her.<sup>104</sup> What, for example, could be more senseless than the position she takes when she mistakes the deer-stealers for murderers? All is going well with her—as well as could be expected—in Dame Fairfield's house, and any change in her situation will mean absolute peril for her, and yet she determines "to let no personal consideration whatsoever, interfere any longer with her causing an immediate investigation to be made into this fearful business".<sup>105</sup> Her attitude toward her involuntary husband shows that her moral sense has no reasonable basis. After eluding him for five volumes, she is finally caught by him; then, when, just in the nick of time, Sir Jaspar snatches her from his clutches, she almost convinces herself that she ought to return to him:

But when she beheld him seized and in custody—and heard him called her husband . . . duty, for that horrible instant seemed in his favor; and had not Sir Jaspar summoned her by her maiden name, to attend her own nearest relative, all her resistance had been subdued, by an overwhelming dread that to resist might possibly be wrong.<sup>106</sup>

<sup>103</sup> For the study of this element in Madame D'Arblay, see the following sections in *Camilla*: II, 222–249, 289–326; III, 382 ff., 391 ff.; IV, 39 ff., 41 ff.

<sup>104</sup> Cf. *Edinburgh Review* (Feb. 1815), 337.

<sup>105</sup> *The Wanderer*, V, 7.

<sup>106</sup> *Ibid.*, V, 326.

Madame D'Arblay's ethical sense may be crude; it may be largely a matter of convention;<sup>107</sup> yet in none of her novels do we become acquainted with the vile in life. As Macaulay says, her works do "not contain a single line inconsistent with rigid morality, or even virgin delicacy."<sup>108</sup> We appreciate this change of atmosphere, especially when just from the unvarnished portions of Defoe or Fielding or Smollett—or even the moral Richardson.

## VII. SOURCES

Without doubt, Samuel Richardson was this author's master. It must not be supposed, however, that in her first novel, at least, she slavishly followed him or anyone else. Mr. Howells correctly says, "She looked in her glass for her model, and wrought with the naïveté of the true artist, especially the true artist who is also young."<sup>109</sup> At the time of the composition of *Evelina*, however, it is certain that she had read the more important novels of her day.<sup>110</sup> Mr. Jeaffreson says that she got "her familiarity with mankind, and her early capability as a writer of fiction from the careful perusal of novels"; and he adds, "Dunlop would fix the plagiarisms of *Evelina* especially in one quarter,"<sup>111</sup> but we do not hesitate to say that style, incidents, sentiments, and portions of the plot were filched from all quarters—very probably, however, without the knowledge of the authoress."<sup>112</sup> If

\* 107 An extract from Madame D'Arblay's *Diary* will show how serious a thing a violated convention was to her: "Startled, as if awakened from a dream, I fixed her and perceived the same figure I had seen at the salon. I now felt sure I was already in the royal presence of the Duchess d'Angouleme, with whom I had seated myself almost cheek by jowl, without the smallest suspicion of my situation.

"I really seemed thunderstruck. I had approached her with so little formality. I had received all her graciousness with so little apparent sense of her condescension, I had taken my seat, nearly unasked, so completely at my ease, and I had pronounced so unceremoniously the plain *vous*, without softening it off with one single *Altesse Royale*, that I had given her reason to think me either the most forward person in my nature, or the worst bred in my education, existing.

"I was in consternation and a confusion that robbed me of breath; and my first impulse was to abruptly rise, confess my error, and offer every respectful apology I could devise; but as my silence and strangeness produced silence, a pause ensued that gave me a moment for reflection which represented to me that *Son Altesse Royale* might be seriously hurt, that nothing in her demeanour had announced her rank; and such a discovery might lead to increased distance and reserve in her future conduct upon extra audiences, that could not but be prejudicial to her popularity, which already was injured by an opinion extremely unjust, but very generally spread, of her haughtiness. It was better, therefore to be quiet, and to let her suppose that embarrassment, and English awkwardness and *mauvaise honte*, had occasioned my unaccountable manners." *Diary and Letters*, ed. Austin Dobson, VI, 137 ff.

<sup>108</sup> *Select Essays of Macaulay* (ed. Thurber), 179.

<sup>109</sup> W. D. Howells, *Heroines of Fiction*, I, 14.

<sup>110</sup> Cf. p. 9 above. In the Preface of *Evelina* Madame D'Arblay speaks of "the knowledge of Johnson", "the eloquence of Rousseau", "the pathetic powers of Richardson", "the wit of Fielding", and "the humour of Smollett".

<sup>111</sup> Cf. quotation below from Dunlop.

<sup>112</sup> J. Cordy Jeaffreson, *Novels and Novelists*, 337 ff.

this be true, it may be said that what Madame D'Arblay acquired from others she made as much her own as did Shakspeare the novella and the other sources of his dramas.

It is probable, however, that Mrs. Heywood's *Betsy Thoughtless* suggested to her the main outlines of the plot of *Evelina*. Dunlop points out certain similarities. "In the novel of Mrs. Heywood," he says, "a young lady makes, at an early age, her first appearance in London on the great and busy stage of life. In the city she resides under the protection of Lady Melassin, a woman of low birth, of vulgar manners, and dissolute character, whose husband had been appointed the guardian of Miss Thoughtless by her father. From this woman, and from the malice and impertinence of her daughter, Miss Flora, the heroine, suffers much uneasiness on her entrance into life. Though possessed of a virtuous mind, a good understanding, and a feeling heart, her heedlessness of ceremony, her ignorance of forms, and inexperience of the manners of the world, occasion many perplexing incidents, and lead her into awkward situations, most mortifying to her vanity, which, at length, alarm the delicacy, and almost forever alienate the affections of an amiable and devoted lover. . . . The chief perplexity of Mr. Trueworth, the admirer of Miss Thoughtless, arose from meeting her in company with Miss Forward, who had been her companion at a boarding school, and of whose infamous character she was ignorant. In like manner the delicacy of Lord Orville is wounded and his attachment shaken, by meeting his Evelina in similar society at Vauxhall. . . . But not only is the plan of *Betsy Thoughtless* analogous to that of *Evelina*, but many of the characters coincide with those delineated in that celebrated performance. Mr. Trueworth is the same generous and pleasing lover as Lord Orville. Lady Mellasin . . . is the same low-born, coarse, and dissolute woman with Mad. Duval. . . . While in the novel of Mrs. Heywood, and of Miss Burney, we may trace the same assurance, affected indifference, and impertinent gallantry, in many of the secondary characters."<sup>113</sup> These likenesses seem more than coincidences. In all probability, this novel, working unconsciously in Madame D'Arblay's mind, suggested to her the main elements of her first story.<sup>114</sup> If this be so, the transformation which the plot underwent only serves to show the superior genius of the later work. *Evelina*

<sup>113</sup> J. C. Dunlop, *History of Prose Fiction*, II, 568 ff.

<sup>114</sup> Mrs. Annie Raine Ellis, however, says: "Mrs. Haywood, who was no credit to novelists, has been said, far from correctly, to have given Fanny the hint for *Evelina* in her novel of *Betsy Thoughtless*." Cf. *Introduct.*, *The Early Diary of Frances Burney*, I, lxxxv ff.



is as bright and fresh and original as if it had had no suggestions from without.

It must not be forgotten, as has already been stated, that Richardson had a strong influence upon this and the succeeding novels. In the size of the latter,<sup>115</sup> their author was, no doubt, following him. Her sentimentality resembles his, tho, as we have seen, she belongs to the school of Henry Mackenzie.<sup>116</sup> In her first novel she imitates Richardson's use of the letter-form to carry on the narrative; but she does not resort to the journal, as he does when in extremities. Her heroines, too, have the same sort of questionings as Pamela and Clarissa, and they spend a great deal of time trying to make up their minds. She followed him in attempting a realistic presentation of life; but, as has been pointed out,<sup>117</sup> she is indebted to Smollett for the character of some of her incidents. The novels are intended to be a satire of society—"novels of domestic satire", as Professor Raleigh calls them.<sup>118</sup> In all of them she exposes the heartlessness and frivolity of the upper class and the vulgarity and cruelty of the middle class. *Cecilia* has an even more definite purpose—to show the harm and injustice of name-compelling wills.<sup>119</sup> But nowhere do we find the insistence of Richardson's complacent, smug morality. All the novels belong to the eighteenth century, and show little of the influence of the advancing Romantic movement. A single exception occurs in *The Wanderer*, in the scene where Juliet, *alias* the Incognita, *alias* Ellis, *alias* The Wanderer, finds the blood in the deer-stealer's house.<sup>120</sup> This undoubtedly finds its source in the Gothic romances.

## VIII. PLOT

Our chief interest in Madame D'Arblay's work does not lie in the story element, for she has no talent for narration. Altho all of her novels are intended to be true to life, the plots are extravagant and impossible. *Evelina* has fewer faults of this nature than *Camilla* and *The Wanderer*, but its plot construction is inferior to that of *Cecilia*. The structure of the latter shows skill, but the incidents are interrupted by the characterization—and the conversation. All the stories lack genuine motivation. We not only feel the author pulling the string, but we see the string. Nor can the plots be said to be deter-

<sup>115</sup> *Camilla*: 5 vols: 2278 pages; *The Wanderer*: 5 vols., 2093 pages.

<sup>116</sup> See above, pp. 12-13.

<sup>117</sup> See above, p. 18.

<sup>118</sup> *The English Novel*, 255.

<sup>119</sup> Cf. *Camilla*, II, 462.

<sup>120</sup> *The Wanderer*, IV, 375.

mined by the characters of the chief persons, as Hamlet's nature determines the plot in *Hamlet* and Macbeth's in *Macbeth*. The minds of these people have no consistency. They are no more than clay in the hands of the author, and at times her hands wobble badly. As has already been indicated, the main plots resemble each other.<sup>121</sup> An unsophisticated girl of refined nature, brought face to face with life under especially trying circumstances, suffers woe after woe at the hands of a more or less vulgar, heartless society. Sudden and unexpected encounters between the heroine and someone whom she is particularly anxious to avoid help to keep up the interest. Each story abounds in lovers who are not wanted, but who insist on manifesting their regard. Some particularly coarse person harrows her delicate sensibilities, and hordes of cruel people consciously or unconsciously ply their ingenuities in tormenting her.

As we have seen, the heroines waste a great deal of time in deliberation. They justify their decisions by the most whimsical reasoning, based generally on some far-fetched sense of honor or etiquette. Even after we have endured these tedious soul-searchings, it all amounts to nothing, for some tormentor suddenly makes his—or her—appearance, and all is changed. Thus the volumes run on and on—and there is no reason why they could not go on forever. They stop because the author has decided to stop them, and for no other reason under heaven. *The Wanderer* might have stopped, and very agreeably, within the first hundred pages; after that, there is no valid reason for its stopping at all. In the first two novels we are interested in the heroines and sympathize with them in their tribulations, and are glad when *at last* they find rest. In the last two novels they are so preposterously scrupulous, and their griefs so unnecessary and far-fetched, that we can take no interest in anything that occurs.

All the plots have one technical excellence. They move straight-forward.<sup>122</sup> There occurs no sudden shift of scenes or turning back of the clock, as in Dickens and Thackeray.<sup>123</sup> All, except the first novel, have a few short asides; but they do not charm us, like those in Thackeray.<sup>124</sup> There is no revelation of the author's delightful personality, nor have they any of Thackeray's confidential manner or affectation of knowingness. Lacking his tone of reminiscent humor, they generally take the form of commonplace moralizations, which in the last novel the heroine utters. All genuine philosophy is wanting, altho the first lines of *Camilla* assume a philosophic tone. Some very

<sup>121</sup> Cf. *Quarterly* (April, 1814), 125.

<sup>122</sup> There are exceptions to this in *Evelina*.

<sup>123</sup> There are a few exceptions to this in the latter part of *Camilla*.

<sup>124</sup> Cf. *Cecilia*, I, 122, etc.; *Camilla*, I, 214, etc.; *The Wanderer*, II, 250, etc.

dramatic situations, however, enliven the earlier novels. The liveliest in *Evelina* are Willoughby's abduction of the heroine,<sup>125</sup> the Vauxhall scene,<sup>126</sup> and the episode in which the Branghtons avail themselves of Lord Orville's chariot.<sup>127</sup> Harrel's suicide,<sup>128</sup> Mr. Delvile's detection of Cecilia in Mr. Belfield's room,<sup>129</sup> Cecilia's first attempt at marriage,<sup>130</sup> and the encounter between Delvile, Hobson, Briggs, and Albany,<sup>131</sup> form the most interesting situations in *Cecilia*. *Camilla* and *The Wanderer* are theatrical and melodramatic thruout. They have no dramatic incidents.<sup>132</sup>

## IX. GENERAL CONCLUSIONS

*Evelina* is the only one of Madame D'Arblay's novels that will live. Macaulay justly designates *The Wanderer* as "a book which no judicious friend to her memory will attempt to draw from the oblivion into which it has justly fallen".<sup>133</sup> Mr. Austin Dobson expresses the same opinion: "The best thing we can say about *The Wanderer* . . . is that it brought grist to the mill."<sup>134</sup> Three thousand, six hundred copies were sold at two guineas each. *Camilla* is as bad. Mr. Dobson classes it with its successor: "We doubt if the piety of the enthusiast could ever revive—or rather create—the slightest interest in *The Wanderer*; or that any but the fanatics of the out-of-date, or the student of manners, could conscientiously struggle through *Camilla*."<sup>135</sup> *Cecilia*, on the other hand, does not merit this condemnation, yet it is hardly a book that in the coming years any but the student will read. It has a better plot than *Evelina*, it has skilful, even if exaggerated, characterization, and it has some dramatic situations; but too many other novels have all its excellencies, without its length, its unnatural style, and its slow, dull movement. Professor Raleigh is right: Madame D'Arblay's "reputation must rest on her two earlier novels,

<sup>125</sup> *Evelina*, I, 114 ff.

<sup>126</sup> *Ibid.*, II, 1 ff.

<sup>127</sup> *Ibid.*, II, 68 ff.

<sup>128</sup> *Cecilia*, I, 403. Professor Raleigh says, "The Vauxhall scene is spirited melodrama, but nothing more; there is not a breath of genuine terror in it all" (*The English Novel*, 259).

<sup>129</sup> *Cecilia*, II, 323.

<sup>130</sup> *Ibid.*, II, 165.

<sup>131</sup> *Ibid.*, II, 293.

<sup>132</sup> There are two somewhat interesting situations in *The Wanderer*: Juliet's dealings with the deer-stealers, near the close of vol. IV, and the encounter between the Admiral and Mrs. Howell (vol. V., 240 ff.).

<sup>133</sup> *Select Essays of Macaulay* (ed. Thurber), 164.

<sup>134</sup> *Fanny Burney*, 194.

<sup>135</sup> *Ibid.*, 202.



and it would lose little of its stability if the later of these were removed".<sup>136</sup>

The first novel has a fair chance for immortality. It is vivacious; it is not too long; it has dramatic situations; and it has a fresh, rare charm. "Evelina, though a goose, is perhaps the sweetest and dearest goose in all fiction."<sup>137</sup> Aside from its intrinsic merits, it has an important place in the history of fiction. Altho by no means the first English novel by a woman, it really marks the beginning of the fine work subsequently accomplished by women in English fiction. Its author stands at the head of that line of women writers to which belong Mrs. Inchbald, Mrs. Radcliffe, Maria Edgeworth, Jane Austen, Susan Ferrier, Charlotte Brontë, and George Eliot. "Before the appearance of Miss Burney, the novel of manners had been cultivated almost exclusively by men"; but with the publication of *Evelina*, "the world is presented in fiction as it appears to a woman".<sup>138</sup> Her book "carries the novel of manners into domestic life, and prepares the way for Miss Edgeworth and the exquisite parlour-pieces of Miss Austen".<sup>139</sup> Sir Walter Raleigh bears the same testimony: "Her brilliant, shrewd satire and close observation were unmatched in her own time, and she prepared the way for Miss Austen, who subscribed for *Camilla*, and took the title of her earliest novel, *Pride and Prejudice*, from the concluding sentences of *Cecilia*."<sup>140</sup> And so, the novel of manners, the most popular class of today's fiction, owes as much to the author of *Evelina* and the women writers who followed her as to Richardson or Fielding or Goldsmith.<sup>141</sup>

Why, then, did the later works of such a writer fail? Because she was not content to go on writing as she had done at first, but now sought to be magniloquent. Her head had been so turned by the success of her first brilliant achievement and she was so conscious of her audience that now she craved applause with every line. The consequence was that she developed every bad tendency that she had. She out-Johnsoned Johnson; she outwept the school of Mackenzie; she sentimentalized beyond even the most sentimental moods of Richardson; and with an artificiality totally depraved, she crushed out the fresh, charming power of her native genius.

The first novel had a narrow escape. The grotesque exaggeration and distortion of *Camilla* and *The Wanderer* were only the outgrowth

<sup>136</sup> *The English Novel*, 260.

<sup>137</sup> W. D. Howells, *Heroines of Fiction*, I, 14.

<sup>138</sup> Wilbur F. Cross, *Development of the English Novel*, 95.

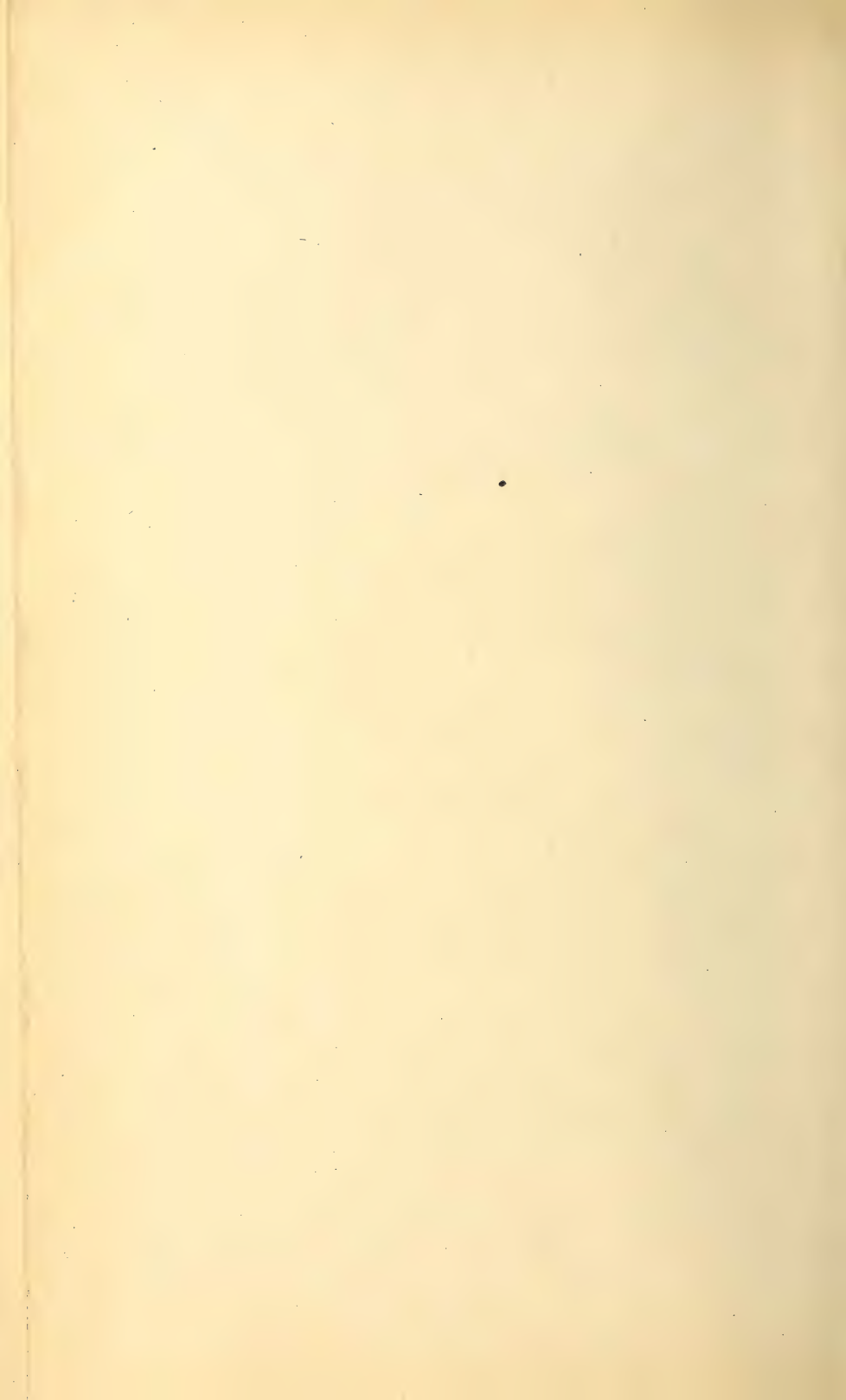
<sup>139</sup> Austin Dobson, *Fanny Burney*, 204.

<sup>140</sup> *The English Novel*, 260.

<sup>141</sup> W. E. Simonds, *Introduction to English Fiction*, 62.

and development of tendencies present but undeveloped in it. It escaped the faults of the others only because it was written with an unpremeditated art and was the natural expression of the author's girlish spirit. At first she had no admiring audience to make her self-conscious and insincere. Her faults had not developed because she had no incentive to exaggeration. Had she been content to be simple and natural and to forget her audience, she might have continued to write novels as delightful as *Evelina*. She failed because she was not satisfied with doing well. Her first success was her ruin. We have cause, therefore, to be glad that she wrote *Evelina* in secret and published it in fear and trembling, and that no untimely praise robbed us of its natural simplicity and its graceful, charming naïveté.

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# INDIANA UNIVERSITY STUDIES



## Study No. 29

NEW SPECIES OF FOSSILS FROM THE PENNSYLVANIAN AND PERMIAN ROCKS OF KANSAS AND OKLAHOMA. By J. W. BEEDE, Ph.D., Associate Professor of Geology in Indiana University.



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## Prefatory Note

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On account of the activity in the oil developments in Kansas and Oklahoma, a more complete knowledge of the fauna of the rocks concerned is necessary for the proper identification of the stratigraphic position of the surface rocks, and the proper interpretation of drill records. The fossils here described are from beds constantly encountered in some of the oil fields, and it is hoped that they may be of assistance to geologists working in that region.

This study is published March 1, 1916.

J. W. B.





# New Species of Fossils from the Pennsylvanian and Permian Rocks of Kansas and Oklahoma

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Associate Professor of Geology in Indiana University

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## PELECYPODA

### *Chaenomya cylindrica* n.sp.

The shell is of medium size, two and a half times as long as high, compressed-subcylindrical in form, being thickest below the beaks in the middle of the shell. The beaks are placed a little less than a third the distance from the anterior to the posterior end of the shell. The shell slopes gently forward from the beaks, with a slight keel shown in the cast, rounding below into the sharp elliptical curve of the anterior end, which, in turn, merges with the very gently convex curve of the ventral margin. This margin becomes nearly straight near its union with the nearly vertical truncation of the posterior extremity. The posterior end is somewhat convex and unites with the end of the hinge in such a way as to form a V-shaped notch between the valves. The notch formed by the ventral part of the hinge is broader. The shell is most nearly cylindrical just in front of the slightly flaring posterior aperture. The beaks are appressed and strongly incurved, and so proximate (as seen in the cast) as to appear to have been in contact. The hinge, posterior to the beaks, is slightly concave, equaling half the length of the shell, and the cast shows a high ridge with a deep furrow on either side of it which sinks below the level of the side of the valves. There is a very faint and ill-defined depression extending downward and backward from the beaks to the posterior third of the ventral margin. This is just sufficient to straighten the slightly convex margin and possibly to make it the least bit sinuous in some specimens. The umbonal ridges are rather well defined above, inside of which is a somewhat flattened zone surrounding the escutcheon. It is quite deep just back of the beaks. The posterior aperture is subcircular. The shell does not appear to have been very heavy, and aside from very gentle undulations of growth, the cast shows no sign of surface markings.

The anterior adductor scars are of average size, situated two-thirds of the distance from the beak to the antero-ventral extremity. They are convex in front, and apparently slightly concave behind, and are roughly quadrangular. The pallial line is deeply impressed, strongly crenulated upward, as seen on the cast, and is somewhat near the margin of the shell. At its posterior end it is acutely sinuate and from that point to its union with the posterior adductor it is convex forward. The posterior adductors are ovate-subquadrate in outline and situated on the dorsal part of the

posterior end of the shell, just in front of the gaping end. Length of shell 75 mm.; height near aperture 27.5 mm.; height at the beaks 30 mm. The length of the hinge is 49 mm. The beak is 24 mm. from the anterior end. Transverse diameter is 24 mm.

From the top of the Neosho formation; railroad cut west of Goose Creek, west of Cambridge, Kansas.

The pallial line seems to be divided for some distance back of the anterior adductor scar. The shell is most like *C. leavenworthana* Meek, but it is much more elongate and slender, with ventral and dorsal borders more convex and concave respectively.

#### ***Chaenomya barbouri* n.sp.**

The cast is rather large, and is twice as long as the depth at the beak. The beak is convex and appressed, incurved, and located about one-third the way from the anterior to the posterior end of the shell. The cardinal border is deeply concave posterior to the beak, and slopes very gently downward in front of it. The ventral border is nearly straight posteriorly, but is convex thruout, and unites with the posterior truncation with a sharp curve. It rounds gradually into the rather broadly rounded anterior margin. The posterior end is very gently convex thruout, otherwise the truncation is nearly vertical, scarcely flaring, and is elliptical in form. The lunule appears to have been rather elongate. The umbonal ridge is subangular at the beaks, but gradually fades towards the lower posterior end. Above this ridge is a somewhat flattened area upon which the large posterior adductor is located. There is a slight flattening of the cast for a short distance below the beaks, but no distinct concavity. Broad, low undulations are seen over the shell below the beaks and umbonal ridges, otherwise, no surface marks are impressed upon the cast.

The anterior adductor is located rather high and very near the anterior border, and the pallial line, faintly crenulated, is double just below it. Thruout its horizontal length the pallial line is located near the ventral margin of the shell. It is acutely sinuate at its posterior end, above which it is gently convex forward. The posterior adductor is quite large and well impressed, and lies about two-thirds the distance from the beak to the posterior end of the shell. It is roughly quadrangular in form. Length of shell 71.5 mm.; length of hinge 58 to 60 mm.; height at the beak 34 mm.; thickness of valves about 30 mm.

From the Fort Riley limestone; Nebraska State line, south of Blue Springs, Nebraska. Professor Wilbur C. Knight, collector.

Upon cursory examination this species might be mistaken for *C. leavenworthana* Meek, which it closely resembles. However, its more curved form, and the more remote location of the beak from the anterior margin, will separate it from that species as well as from *C. cooperi* (Swallow). Its robust form, the elliptical form of the posterior, as well as its general appearance, separate it at once from *C. cylindrica*.

#### ***Chaenomya meekana* n.sp.**

Shell of moderate size, twice as long as high, beaks remote from the anterior margin. The dorsal margin is very straight for this genus. The anterior end is rather sharply rounded, while the ventral margin is very slightly

convex, rounding rather more gradually than usual into the truncated posterior, which is inclined somewhat forward and is subelliptical in cross-section. The lunule is narrowly elliptical and nearly horizontal, otherwise, as in the other species. The escutcheon is apparently shorter, narrow, and better defined than in most of the other species. It is well set off by a sharp ridge on each valve. The ridges nearly meet posteriorly, giving it a lanceolate form. The valves are thickest posteriorly, the shell narrowing toward the front. The umbonal ridge is subangular toward the beaks, becoming more rounded below, but persisting as a ridge to the postero-ventral angle of the shell. It also falls more rapidly than in some species of the genus, making a wider area above it. At the same time the undulations of growth which are fairly well impressed upon the body of the cast are traceable over this area, being nearly as distinct as on the body of the shell. Muscle marks and pallial line are not shown. Length of shell about 60 mm.; height about 30 mm.; beak 17.5 mm. from the anterior end; length of hinge 43 mm.; transverse diameter 22 mm., near the middle of the shell.

Floreana shale; Grand Summit, Kansas.

This species differs from *C. leavenworthensis* Meek and *C. cylindrica* in its straighter cardinal margin and better defined escutcheon, as well as the wide region above the umbonal ridge. The truncation is somewhat more oblique and more widely gaping than in *C. barbouri*. The undulations are stronger than on any of the other species of the genus except *C. minnehaha* (Swallow).

### ***Chaenomya johnstoni* n.sp.**

The shell is rather large, hardly twice as long as high, with the beaks about a fourth the length of the shell from the front end. The umbonal region is rather high, the front broadly rounded and passing gradually into the gently convex base. Posteriorly the ventral margin rounds rather gradually into the oblique posterior truncation. The dorsal margin is relatively short and quite concave. The beaks seem to have been practically in contact, as is not uncommon in some of the species of the genus. The umbonal ridge is well defined near the beaks and remains rather high to the central part of the posterior end of the shell, which is widely gaping. The opening is broadly ovate in form. The surface is marked with rather fine undulations of growth and rows of strong granules radiating from the beaks. Length 76 mm.; length of hinge 53 mm.; beaks 18.5 mm. from the front end; height 39 mm.; diameter of the shell in the thickest part near the beaks 29.5 mm.; a line from the beak to the postero-ventral margin is 70 mm. long.

Shale on the Americus limestone; two and a half miles southwest of Americus, Kansas. Harry Johnston, collector.

This shell differs from *C. leavenworthana* Meek in being longer from the beak to the postero-ventral angle, in possessing rows of coarse granules rather than fine ones, and in possessing a more gentle slope at the lunule, giving a broader aspect to the anterior end of the shell.

### ***Myalina shannoni* n.sp.**

The shell is large, subquadrate in form, and is quite thin when compared with *M. subquadrate*. The hinge is apparently as long as the shell at any place beneath it. The ventral margin is so thin that it is preserved in none



of the specimens at hand. The anterior margin is gently concave below the beaks, which are sharp, but not recurved. A large portion of the posterior part of the shell is nearly flat. There is a slight sinus below the posterior extremity of the hinge as in *M. subquadrata*, which makes the shell slightly lobate posteriorly. Toward the ventral region the anterior and posterior margins are at right angles to the hinge.

When the size of the shell is taken into account, the height of the hinge area is very small, which is in accord with the thinness of the shell. The right valves are relatively much shallower within and flatter in general appearance than the right valves of *M. subquadrata*. The plate in the right valve at the front end of the hinge is strongly developed.

|                                    | <i>M. shannoni</i> | <i>M. subquadrata</i> . |
|------------------------------------|--------------------|-------------------------|
| Length of hinge.....               | 70.                | 35.5                    |
| Width of hinge area in center..... | 5.                 | 7.25                    |
| Number of lines on hinge area..... | 7.                 | 10.                     |
| Depth of valve cavity.....         | 8.5                | 7.5                     |
| Convexity of valve.....            | 18.5               | 11.5                    |
| Depth of valve.....                | about 105.         | 56.                     |

Another specimen from a different horizon and locality gave a length of hinge of 50 mm., and a height of 80. The hinge is as long as the shell at any point below it.

Willard shales(?); near Foster, Oklahoma.

From the above measurements it is at once apparent that this is a very thin-shelled species of large size, with a narrow hinge plate and slight convexity when compared with *M. subquadrata* Shumard with which it is associated. The manner in which the growth marks approach the hinge separates it at once from *M. ampla* Meek. In none of the specimens from Foster was a complete shell seen, and on examination it was found that the lower portion of the shell was almost paper thin, in striking contrast to *M. subquadrata* Shumard.

### *Myalina girtyi* n.sp.

The shell is fairly large for the genus, transversely quite elongate and rather narrow. The hinge is nearly straight and shorter than the length of the shell below it. The beak is well produced, sharp at the point, but not recurved. The hinge is straight and the ligamental area is wide. The ventral part of the shell is ovate in outline. The anterior margin is somewhat concave and joins the beak, making a 45° angle with the hinge. The posterior part of the shell is convex thruout, rounding obliquely forward to meet the hinge. The right valve, as in some other species of the genus, is flatter and less distinctively ornamented than the left. The left valve is ornamented by lines of growth, regularly and rather widely spaced. The main axis of the shell makes an angle of 100° with the hinge. The posterior extremity of the hinge is rounded off somewhat, since the later plates project farther to the rear than the earlier ones, as the shell increases in size, completing the rounded appearance of the posterior region.

The interior of the shell is marked by a wide ligamental area, with 10 to 14 grooves and ridges, and the sharp projection of the plate beneath



the beak. The posterior flattening in these shells is rather small. Shell thickening goes on to a considerable extent in the region beneath the hinge. The platform for the anterior adductor attachment is small. The posterior adductor scar is large, roughly ovate, rounded below, nearly straight on the long posterior side, but it is notched on the upper anterior margin. Measurements of seven specimens are as follows:

|                                  | 1    | 2    | 3    | 4     | 5    | 6    | 7    |
|----------------------------------|------|------|------|-------|------|------|------|
| Length of hinge...               | 37.  | 39.  | 34.  | 36.75 | 32.5 | 43.5 | 39.5 |
| Height of shell....              | 68.5 | 73.5 | 70.  | 72.   | 69.  | 91.  | 64.5 |
| Length parallel to<br>hinge..... | 43.  | 41.5 | 38.  | 42.   | 46.  | 58 ± | 39 + |
| Height of hinge<br>plate.....    | 10 ± | 14.  |      | 10.   | 10.  |      |      |
| Transverse diam-<br>eter.....    | 24.5 |      | 25.5 |       |      | 29.  | 28.  |

Willard shales(?); *Myalina* cut, on Midland Valley railway, near Foster, Oklahoma.

The obliquity of the main axis of the shell, which is 10°, the convex posterior border, and the short hinge at once separate this species from *M. subquadrata* Shumard. The small obliquity of the main axis of the shell to the hinge line, the regular lamellae of growth, and its flatter appearance at once remove it from *M. kansasensis* Shumard. It has relatively little resemblance to the remainder of the species assigned to this genus. However, care is necessary in dealing with right valves of this species and *M. subquadrata* Shumard, since the right valves of these species fit into the left valve and are flatter. Thus the right valve of *M. subquadrata* has nearly the same form as the left valve of this species. It is difficult, tho by no means impossible, to separate them.

#### ***Myalina bialata* n.sp.**

Shell large, bialate above, more or less ovate on the ventral margin. The hinge is very long; the beak and posterior extremity are greatly produced in adults so that the ventral part of the shell has somewhat the appearance of a sack suspended obliquely from the long hinge. Both the anterior and posterior margins retreat below the hinge, producing strong concavities in the outline of the shell. If the lines of the sinus below the beak, and the one below the posterior part of the hinge, were produced, they would cross nearly at right angles just below the center of the shell. The shell of the beak is greatly produced beyond the terminus of the umbones within the shell. In some instances this prolongation of the beak beyond any cavity in the shell equals nearly a third of the length of the hinge. In like manner the posterior prolongation of the hinge beyond the body of the shell may, in some instances, be nearly a fifth of the length of the hinge. The main axis of the shell has an obliquity of about 15° to the hinge line. The body of the shell in the ventral region possesses a somewhat ovate curve, the posterior part merging with the very gently convex posterior margin until it approaches the hinge, whence it curves abruptly backward and then upward and finally a little forward to the hinge. The anterior margin is somewhat broadly

sinuate beneath the beak and nearly straight below until the vicinity of the venter is reached, when it joins the curve of the base. The surface is ornamented with fine concentric laminae with an occasional coarser one. The beak shows strong lines of growth.

The following measurements are of an immature specimen in which the fullness of the peculiarities of the shell are not well brought out. Larger specimens have these features much more accentuated. However, since it is the only specimen at hand that is nearly perfect, it is used. Length of hinge, tip of beak gone, 58 mm.; total length about 63 mm.; height of shell 65 mm.; greatest length of shell below the hinge 31 mm.; width of hinge plate on larger specimen 6.5 mm.

Fort. Riley limestone; Blue Springs, Nebraska. It also occurs as low as the Eskridge shales, at Grand Summit, Kansas.

This species is closely related to *M. aviculoidea* Meek, but our shells appear to have been flatter while the lines of growth show a distinct sinuosity on the posterior side in specimens smaller than the type of Meek's species. Moreover, specimens from Texas seem to show that the species are clearly distinct. The shells are far from rare in a bluish clayey limestone at the quarries at Blue Springs, but complete specimens were very difficult to secure at the time of my visit there. Indeed I do not remember of having seen a large perfect cast. One peculiar thing about it is that the larger part of the shell is frequently shown in these specimens, but some part is usually missing. There is no likelihood of confusing this species with any other shell.

#### ***Pleurophorus beckwithi* n.sp.**

Shell small, elongate, slightly higher posteriorly than in front. The beak is somewhat removed from the anterior end on account of a distinct forward prolongation of the shell in the region of the anterior adductors. The hinge is gently arcuate and the posterior end is not truncated, but rounds with very narrow curve into the ventral margin, which is straighter than the dorsal border. The anterior end is very sharply rounded below and slopes obliquely backward and upward to the beak in the upper half of the shell. The umbonal ridge is not well developed and the depression obliquely below the beak is wanting. The posterior lateral tooth is well developed, and one long tooth projects forward just below the beak, while there is a socket just as large above it. The adductor scar is small but prominent, and is separated from the rest of the shell by a short, broad ridge. No pedal scar is visible in the cast. Surface ornamentation is unknown. Height of the cast at the beak 4.5 mm.; length 11.5 mm.; beak 1.5 mm. from anterior end.

Double Mountain Beds(?) Permian; "Buckle L" Ranch, at the top of the breaks about a mile east of the west fence, and two and a half miles south of the north fence. Calcareous sandstone bed. Cottle county, Texas. Collected by H. T. Beckwith.

#### ***Deltopecten ballingerana* n.sp.**

The shell is large, nearly as high as long, rather convex, slightly oblique, with the hinge nearly as long as the shell. The ears of the left valve are large, the anterior one being separated from the shell by a rounded, rather indefinite sulcus, with considerable marginal constriction below it. The posterior ear is apparently somewhat longer than the anterior one, and

terminates with a sharper angle. It is less sharply separated from the shell and has a broader marginal sinus below it. The anterior ear of the right valve is separated from the shell by a deep marginal sinus extending more than half way to the beak.

The body of the right valve is ovate in outline, most convex above the middle, with the beak projecting slightly above the hinge. The anterior part of the larger specimens possesses a wide zone of stronger growth marks and fainter radiating sculpturing than is found on the rest of the valve. The surface of the valve is covered with three ranks of radiating costae. The largest, eight to twelve in number, appearing at rather wide intervals, reach the beak. Between the larger costae there are from two to six smaller costae. All these ribs are split, each one being doubly carinated at its crest, or it is formed of two similar ones, giving the shell a unique appearance. These costae extend over the ears, being much stronger on the anterior one, on which seven or eight can be counted while four or five faint ones appear on the posterior ear. Both coarse and fine growth lines ornament the valve. The former are rather conspicuous and are rather widely spaced. The larger costae are very indistinctly developed on the posterior half of the shell and are quite prominent on the anterior half. There seems to be some evidence that the surface was roughened by vaulted lamellae, but not markedly so.

A faint impression of the right valve shows it to be very flat, and to be marked by nearly even radiating costae of moderate size. Other characters are not well shown. Length of shell about 60 mm.; height 51 mm.; convexity of left valve 7 mm. Smaller specimen, hinge is 31 mm.; height of same specimen 40 mm.; length of shell 39 mm.

This species is similar in outline and superficial appearance to *D. texanus*, Girty from the rocks below, but its unique split-rib ornamentation and probably thinner shell separate it at once from that shell.

Quarries in the west part of Ballinger, Texas, on the north side of the Colorado river.

### FUSULINA

The nomenclature of the American Fusulinas as applied by von Staff has been discussed by Girty<sup>1</sup> so far as the application of terms is concerned. It only remains to confirm some of Girty's suspicions in the matter with facts, and to make a few additions.

Meek described *Fusulina cylindrica* var. *ventricosa*, from the Juniata bridge and Manhattan. This species was figured in Meek's *Paleontology of the Upper Missouri*<sup>2</sup> and the specimen is clearly a Fusulina, and not a Girtyina. Furthermore the specimens described by von Staff from Illinois are clearly Girtyinas and *not* Fusulinas. In the third place, Girtyina can not be legitimately considered a subgenus of Fusulina. It is a distinct genus, as I shall point out in another place. This leaves *Fusulina ventricosa* a distinct species, from the basal Elmdale formation, of Kansas.

Girtyina is confined to the rocks below the Bethany Falls limestone, or, to the Des Moines stage of the Pennsylvanian. So far as I am at present

<sup>1</sup>On the Names of American Fusulina, *Jour. Geol.* XXII (1914), 237-242. Discussion of Monograph of American Fusulinas by Hans v. Staff, *Paleontographica*, Band 59, 4te Lieferung (1912), 157 ff.

<sup>2</sup>*Pal. Upper Missouri* (1864), pp. 14-15, pl. i, figs, 6a-g.



aware, *Fusulina ventricosa* is not found below the Emporia limestone. The stratigraphic interval between the top of the Des Moines and the Emporia limestone is 1,100 feet. Von Staff had these data before him when he mixed the species. Had he used these data, there would have been no confusion. The result is, as Girty suggested it might be, that *Girtyina ventricosa* is quite distinct from *Fusulina ventricosa*.

Moreover, as luck would have it—I know not to what else to ascribe it—von Staff chose a typical *Fusulina ventricosa* for one of his figures of *F. "secale"*, supposed to have been described by Say from the vicinity of the Platte river, in Nebraska. Now it so happens, as suggested by Girty, that the *Fusulinas* of that place are very slender species from horizons very much lower than that from which *F. ventricosa* comes. So the matter stands at present somewhat like this: *Girtyina ventricosa* v. S. is a distinct and valid species, but belonging to a different genus from *Fusulina ventricosa* Meek. Von Staff's *Fusulina "secale"* is *Fusulina ventricosa*, and Girty's description of *Fusulina secalica*, under the name of "Triticites", must be considered as the typical description of Say's species. The figures in my first report, and the description, were general.<sup>1</sup>

Girty's remarks regarding the deliberate substitution of *Schellwieniana* for *Fusulina* are certainly to the point and *Fusulina* should be used as the generic characterization of the organisms for which it was proposed.

There are several species of *Fusulina* not described by von Staff, and the preliminary descriptions of some of them follow:

### ***Fusulina obesa* n.sp.**

Shell quite large, elongate, having blunt ends and the central third of the roll greatly swollen. This enlargement divides the shell into three distinct parts: the two ends which are subcylindrical, and the central zone which is quite convex in outline. The impressed lines of the shell are inconspicuous, giving the shell a smooth appearance. About half of the end sections are occupied by the vesicular portion of the shell becoming narrower toward the central region, where it becomes axial. The fluting of the septa is much less marked in the central regions than toward the ends. The reinforced zone, expanding from the ends of the primordial chamber, is highly developed, filling most of the space between the whorls of the shell, leaving a rather narrow communication slit, tho it is rather high. The walls of this species are relatively quite thin. The opaque layer is better developed than in *F. longissimoidea*, following, but it is less strongly developed than in *F. ventricosa* of Meek.

The septa are but slightly curved, as seen in cross-section, until the eighth or tenth whorls are reached, when they become somewhat crescent-shaped, concave side forward. The septa seem to be formed primarily by the turning in of the opaque layer, but the punctate layer also seems to take part in their formation, as well as the formation of the reinforcing hoops of the central portion, which are developed from the ends of the septa. Transverse diameter 3.8 mm.; length 9.3 mm.; ratio approximately 1: 2.45; diameter of the primordial chamber .22 mm. The following table shows the number of chambers per whorl in two specimens:

<sup>1</sup>*Univ. Geol. Surv. Kans.* (1900) VI, p. 10, pl. i, ff. 1.



|               | No. 1.      | No. 2. |
|---------------|-------------|--------|
| Whorl 1.....  | 10 +        | 11 +   |
| Whorl 2.....  | 15 -        | 17 -   |
| Whorl 3.....  | 23          | 21     |
| Whorl 4.....  | 25          | 22     |
| Whorl 5.....  | 30          | 32     |
| Whorl 6.....  | 34          | 33     |
| Whorl 7.....  | 37          | ....   |
| Whorl 8.....  | 42          | ....   |
| Whorl 9.....  | 44          | ....   |
| Whorl 10..... | Incomplete. |        |

Thickness of the walls .06 to .09 mm.; opaque layer on one specimen .024 mm.; punctate layer .066 mm. The measurements of the different stages of growth as revealed in axial section are as follows:

|              | Width. | Length. | Ratio.   |
|--------------|--------|---------|----------|
| Whorl 1..... | .35    | .45     | 1:1.28   |
| Whorl 2..... | .7     | 1.00    | 1:1.43   |
| Whorl 3..... | 1.18   | 1.8     | 1:1.53 - |
| Whorl 4..... | 1.75   | 2.95    | 1:1.68 + |
| Whorl 5..... | 2.4    | 4.43    | 1:1.85 - |
| Whorl 6..... | 3.05   | 5.85    | 1:1.9    |
| Whorl 7..... | 3.6    | 8.45    | 1:2.35   |
| Whorl 8..... | 3.8    | 9.3     | 1:2.45   |

Base of Elmdale formation and Neva limestone; Grand Summit, Kansas; and Foraker, Oklahoma.

For comparison with this species the critical figures for the thickness of the wall of *F. ventricosa* Meek, collected at the type locality and horizon are given: Thickness of wall, 8th whorl, .121 mm.; of punctate layer .087 mm.; of the opaque layer .037 mm.; thickness of opaque layer on excentric cross-section .016 mm. This illustrates the thinning of the opaque layer as well as the wall toward the ends of the shell. The thickness of the septa in *F. ventricosa* Meek is also much greater than in *F. obesa*, which, together with the striking difference in form, easily separates the two into distinct species.

#### ***Fusulina longissimoidea* n.sp.**

The shell is long and cylindrical with indistinct furrows. The ends of the shell are rather blunt. The height of the whorls increases rapidly to the ends of the shell. The cellular zone extends from near the center to the ends of nearly all the whorls. The septa are rather highly fluted thruout, in which respect it differs from the previously described *Fusulinae* from Kansas. Septa imperforate, or pores very rare. The primordial chamber is large. Diameter of primordial chamber .3 x .26 mm.; in another specimen the diameter is 2.45 mm.; length 10.25 mm.; six whorls radially in 1.25 mm.; ratio 1 to 4.18.

The table below shows the form of successive stages as seen in axial section:

|              | Width. | Length. | Ratio. | Chambers<br>in Whorl. |
|--------------|--------|---------|--------|-----------------------|
| Whorl 1..... | .35    | .6      | 1:1.7  | 14                    |
| Whorl 2..... | .5     | 1.5     | 1:2.5  | 22                    |
| Whorl 3..... | .9     | 2.75    | 1:3.05 | 24                    |
| Whorl 4..... | 1.3    | 5.      | 1:3.85 | 27                    |
| Whorl 5..... | 1.88   | 8.25    | 1:4.4  | 29                    |
| Whorl 6..... | 2.45   | 10.25   | 1:4.18 | 31 ±                  |

Thickness of opaque layer .026 mm. to .016 mm.; punctate layer .056 mm. to .079 mm.; wall in central region about .09 mm.

Base of Elmdale formation; Foraker, Oklahoma.

This species differs from *F. longissima* mainly in the finer and more complicated structure of the vesicular region.

### ***Fusulina emaciata* n.sp.**

Shell long and slender, somewhat elliptical in outline, ends somewhat blunt. The septa are highly fluted thruout, tho possibly a little less deeply so in the central region. Seen in axial section the walls diverge notably toward the ends of the shell. The chambers in the first four of the six or seven whorls run 12, 18, 21 23, or 24, respectively. Developmental statistics are as follows, as seen in axial section:

|              | Width.     | Length. | Ratio. |
|--------------|------------|---------|--------|
| Whorl 1..... | .225       | .3      | 1:1.33 |
| Whorl 2..... | .375       | .7      | 1:1.80 |
| Whorl 3..... | .575       | 1.4     | 1:2.44 |
| Whorl 4..... | .95        | 2.7     | 1:2.8  |
| Whorl 5..... | 1.4        | 3.6     | 1:2.57 |
| Whorl 6..... | 2.025      | 5.6     | 1:2.76 |
| Whorl 7..... | Incomplete | 7.15    | 1:3.18 |

Primordial chamber large, .1 mm. in diameter; thickness of the wall, fifth whorl, .066 mm.; opaque layer .016 mm.; punctate layer .049 mm.

Florena Shales; Grand Summit, Kansas.

This species is strikingly like *F. longissimoidea*, but is smaller, of somewhat different form, showing a different development not due to dimorphism, and is from a higher horizon.

### ***Girtyina haworthi* n.sp.**

Shell small, fusiform. Walls very thin and diverge markedly toward the ends, when seen in axial section. They possess an outer and an inner opaque layer, instead of a single one. The punctate layer is not punctate, but a very thin layer of more translucent material than the material on either side of it. The septa are well fluted thruout. The walls are .03 to .05 mm. in thickness. At its very thickest, the translucent layer is .0166 mm. The opaque layers are distributed about equally on either side of it,

and make up the remainder of the thickness of the walls. The growth stages are as follows:

|              | Width.     | Length. | Ratio. |
|--------------|------------|---------|--------|
| Whorl 1..... | .25        | .5      | 1:2    |
| Whorl 2..... | .403       | .92     | 1:2.29 |
| Whorl 3..... | .610       | 1.4     | 1:2.72 |
| Whorl 4..... | .875       | 2.05    | 1:2.34 |
| Whorl 5..... | 1.2        | 3.02    | 1:2.53 |
| Whorl 6..... | 1.633      | 4.4     | 1:2.7  |
| Whorl 7..... | 2.166      | 5.95    | 1:2.74 |
| Whorl 8..... | Incomplete |         |        |

The total length of the shell is 7.8 mm., and the diameter 2.65 mm., giving a ratio of 1 to 2.94. The slit is .016 in the first whorl and .0402 x .175 in the fifth whorl, occupying less than half the space between the whorls. It expands more rapidly in width than is the case in *G. robusta* v. Staff. In general form it bears little resemblance to that species. The ratio of that species, as given by von Staff, is about 1:1.7.

Lower Fort Scott limestone; Fort Scott, Kansas.



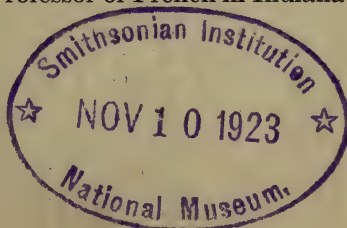


# INDIANA UNIVERSITY STUDIES



## Study No. 30

WASHINGTON IRVING'S FICTION IN THE LIGHT OF  
FRENCH CRITICISM. By GEORGE DAVIS MORRIS, DR. D'U.  
(Paris), Associate Professor of French in Indiana University.



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# Washington Irving's Fiction in the Light of French Criticism

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By GEORGE DAVIS MORRIS, Dr. d'U (Paris)  
Associate Professor of French in Indiana University.

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## I. INTRODUCTION

Irving shares with Cooper the honor of having demonstrated to France that a new literature had dawned on this side of the Atlantic. He gained a foothold in France by means of his *Sketch-book*, which, already famous in England, was translated into French in 1821. Two years later, *Bracebridge Hall* was translated. The success of these two books is indicated by the fact that in the following year a much earlier work, one, moreover, which was only in part written by Irving, *Salmagundi*, was likewise translated and published. In 1825 Irving's next production, *Tales of a Traveler*, was made accessible to French readers. This was followed, in 1827, by a translation of another early work, the *History of New York. Alhambra*, the last of his important works of fiction, was translated in 1833, soon after its first appearance in English.

Irving's popularity in France is proved, however, not only by the publication of his works in that country, but also by the testimony of his French critics. Xavier Eyma gives Irving the entire credit of having "forced the hand, so to speak, in France as well as in England, of the prejudices that were cherished against the literature beyond the sea".<sup>1</sup> Fontaney admitted, in 1832, that the French were very fond of Irving,<sup>2</sup> and a few years later Philarète Chasles declared openly that he had become a popular author.<sup>3</sup> That this popularity was lasting is suggested by the following statement, made by Octave Sachot, in 1855: "Washington Irving has not aged. He is still the Geoffrey Crayon of earlier days, the pleasing essayist of thirty years ago, the delightful moralist who charms both young and old."<sup>4</sup>

<sup>1</sup> *Revue contemporaine*, XL (1864), 657.

<sup>2</sup> *Revue des Deux Mondes*, June 1, 1832, p. 548.

<sup>3</sup> *Ibid.*, July 15, 1835, p. 191.

<sup>4</sup> *Athénæum français*, 1885, p. 385.

The first expression of critical opinion concerning Irving that we have been able to find appeared in 1825 in the *Globe*. From that time until the day of his death his writings continued to attract the attention of French men of letters. A number of critical notices of his books were published in the *Globe* and the *Revue encyclopédique*. From time to time more serious articles by such well known critics as A. Fontaney and Philarète Chasles found their way to the public thru the columns of the *Revue des Deux Mondes*. For the most part, however, the best of the appreciations of Irving that we owe to the French did not appear until after his death. One of the most notable of these is that of Xavier Eyma, published in the *Revue contemporaine* in 1864. The placing of Irving on the list of English authors to be studied in French schools was followed by the appearance of several editions of the *Sketch-book*, each of which was provided with an introduction more or less critical in character.

## II. ANALYSIS OF APPRECIATIONS

**The *Globe* and the *Revue encyclopédique*.** The *Globe*, a literary journal established in 1824, was one of the very few periodicals which at that time showed an interest in foreign literatures. No periodical of that epoch is more frequently mentioned in connection with the liberalizing tendencies of the Romantic movement. The *Revue encyclopédique* was another literary journal which contributed to the triumph of Romanticism, altho prior to 1825 it had been considered a representative of Classicism. To these two journals America is indebted for many of the earlier French appreciations of Cooper as well as for those of Irving already mentioned. It must be admitted, however, that the authors of these articles were not, as a rule, critics of first-rate importance. Sainte-Beuve, we believe, is the only exception and his contributions were very infrequent.

Of the critical notices of Irving that were published in the *Globe*, the most significant, perhaps, is that signed "E. D." which appeared in the issue of March 31, 1827. Like the early appreciations of Cooper which appeared in this journal, it is far from eulogistic. Of the works of Irving which were at that time accessible in French translation, the only one that found favor in the critic's eyes is the *Sketch-book*. He prefaces his observations with the statement that Irving's talent lacks originality, that one always feels that he is writing "under the eyes of England and not under those of his mother country" (p. 521). *Salmagundi*, which he recognizes as the joint



work of Irving and Paulding, he does not find "very amusing". He speaks in rather contemptuous terms of the exaggerated importance which the authors attach to everything American, and he claims that the publication resembles English magazines in its lack of "decency and good taste". He asserts, in fact, that its sole value consists in its pictures of manners in America at that time. The *History of New York* he does not find "very amusing" either. He says it is a work somewhat like those of Rabelais "but for a thousand reasons less amusing". While he cannot say that it is a good book, he admits that the character of the author is "rather cleverly drawn", that Knickerbocker himself shows a "certain amount of originality". The descriptions, in *Bracebridge Hall*, of private life in England in his opinion are too flattering. Of the book as a whole, the most favorable comment he makes is that it is "sometimes amusing, sometimes tiresome". On the other hand, he speaks well of the *Tales of a Traveler*, calling attention in particular to the simplicity of construction by which the stories are characterized. The *Sketch-book* elicits his unbounded admiration. "One may say," he writes, "that nothing more piquant and original has appeared since the days of Sterne. . . They breathe the most wholesome morality and are written in the happiest and purest style." While hesitating to single out any particular sketch as superior to the others, because, as he says, they are all "finished works of art which must all be read", he nevertheless mentions as showing most distinction, "Stratford-on-Avon", "The Country Church", and "The Widow and Her Son".

The praise bestowed on Irving by the *Revue encyclopédique* is likewise heavily alloyed. For, altho it regards Irving as one of the two "transcendent geniuses of the United States" (the other being Cooper), it nevertheless says of him that he was a man who "made the most of a little mind and a little talent".<sup>5</sup>

**A. Fontaney.** In 1832 the leading periodical of France, the *Revue des Deux Mondes*, published its first article on an American writer of fiction. This writer was Washington Irving. The article, written by A. Fontaney,<sup>6</sup> was only in part critical—it contained copious extracts from the *Alhambra*, which had just been published and had not as yet been translated into French. Like his fellow-critics of the *Globe* and the *Revue encyclopédique*, M. Fontaney is far from bestowing upon Irving undiluted praise. While admitting that several of the tales show "grace and delicacy", that the author is "both amiable and witty", and that he seems to understand Spain

<sup>5</sup> *Revue encyclopédique*, XLIX (1831), 625.

<sup>6</sup> *Revue des Deux Mondes*, June 1, 1832.

and its people fairly well, he thinks, on the other hand, that his observation is "perhaps at times superficial and incomplete", that he fails properly to appreciate Spain's poetic aspects, that he is completely lacking in originality, and that it is doubtful whether his fame will endure. He agrees with "E. D." in considering the pictures of English life in olden days (in *Bracebridge Hall*) as "forced", but he differs from him widely in his estimate of the *History of New York*, which he regards as being undoubtedly the wittiest and the most piquant of Irving's work.

**Philarète Chasles.** Philarète Chasles, a journalist of cosmopolitan tastes, who wrote for the *Revue des Deux Mondes*, the *Journal des Débats*, and the *Revue encyclopédique*, who, moreover, resided in England from 1819 to 1826, speaks briefly of Irving in the *Revue des Deux Mondes* in 1835 and again in 1841. He recognizes, in 1835, that both Irving and Cooper have become popular in France, but he denies that their works show the existence of a literature that can fairly be called American. Irving is "quite English", he says, and "copies Addison".<sup>7</sup> In 1841 he regards him as the "best writer of which the United States can boast", and credits him with possessing "taste and learning" and a style "elegant, refined, and polished", but he still maintains that Irving "strives to continue Addison and Robertson, his masters", rather than to create something new.<sup>8</sup>

In 1851 he speaks of him at greater length in an article which has since been published in a collection of studies on Anglo-American literature. He still finds much to praise in Irving's style—its simplicity, its sobriety, its grace, the harmoniousness of its coloring, and the purity of its form—but he cannot conceal from himself, he says, the fact that beneath it there is a certain lack of strength. Irving's imagination, he declares, is not vivacious, his intelligence is neither creative nor profound, his sensations are not strong. "Irving pleases us," he says, "but he does not move us." He accuses him of making a fetish of English writers, especially the contemporaries of Pope. "In Irving there is absolutely nothing American," he writes, "all his thoughts are turned toward England. . . . For Irving everything written by the contemporaries of Pope is as sacred as the gospel." Strangely enough, at the end of his study he admits that Irving had a certain amount, altho very small, of originality. "With Irving appears the first gleam of genuine originality," he says, "with which American literature is crowned." The most pleasing of Irving's

<sup>7</sup> *Revue des Deux Mondes*, July 15, 1835, p. 170.

<sup>8</sup> *Revue des Deux Mondes*, April 15, 1841, p. 309.

works, in his judgment, are the *History of New York*, the *Sketch-book*, *Bracebridge Hall*, and the *Tales of a Traveler*.

**Xavier Eyma.** One of the most noteworthy contributions made by France to the literature on Irving comes from the pen of Xavier Eyma. It was published in the *Revue contemporaine* in 1864. It appeared also, in the same year, as an introduction to a translation of Irving's *History of the Conquest of Granada*. M. Eyma passed several years in America and wrote nearly a dozen books about it. In fact, it was these books, in which he treated of American life, manners, legends, and history, that brought him into public notice. His opinion of Irving is much more favorable than any of those we have been considering, which in view of his uncompromising hatred of democracies is rather surprising. It will not appear so strange, however, if we assume that the article in question was originally written as an introduction to the book above mentioned.

He begins by asserting<sup>9</sup> that altho France has not as yet sufficiently recognized American literature, the hour of justice will come. He regards Washington Irving as the man whose mission it was, in the first place, to imbue his own country with a "taste and a passion for letters", and, in the second place, to overcome the prejudices that were entertained against American literature in England and in France. For the accomplishing of this task he thinks Irving had all the requisite qualities: wit, cleverness, keenness of observation, deep literary feeling, and exquisite grace of expression. Irving's literary success, says M. Eyma, not only in America but in England and France as well, was not the result of a calculating art, of cunning devices, of a continuous striving for effect, but of his "native spontaneity". So successful was he in the longer short story, in the opinion of this writer, that he had "no reason to fear rivals even among the cleverest writers who have excelled in this difficult and graceful form of literature". The *Sketch-book*, he asserts, contains some stories "that will endure as marvels of grace, sentiment, and style"; the *Tales of a Traveler* comprise a "series of charming sketches", and the volume of tales of the Alhambra is a veritable gem. "Whether we consider it pure romance or romantic history, all men of taste", he says, "will regard it as a masterpiece."

The only criticisms he offers are on *Salmagundi* and *Bracebridge Hall*. The former work he thinks sadly aged. So rapidly has the New World changed, he says, that there is not a single portrait in *Salmagundi* that is recognizable. So wholly of another epoch does it

<sup>9</sup> *Revue contemporaine*, XL (1864), 576.



appear to him that he finds it difficult to understand the intense amusement caused by the work at the time of its first appearance. The pictures of English life in the latter work, M. Eyma, like his predecessors, finds "a little strained". This view, which was the traditional one in France, is not to be wondered at if we take into consideration the anti-English feeling that developed during the later Napoleonic wars. Wellington and Waterloo were not soon to be forgotten.

**Sketch-book Introductions.** Among the studies of Irving published in French editions of the *Sketch-book*, we have selected those of L. G. Rosenzweig (1887), E. Haussaire (1888), and P. Fiévet (1891) as being most significant.

M. Rosenzweig informs us that in England and America the *Sketch-book* was read by everybody, that in Germany it was studied in the *Realschulen*, and that in France it had been made a subject of study in the universities and in certain schools for less advanced students. Its popularity was due, he thinks, to its style, to its "rich and varied vocabulary", to the "rare felicity of its expressions", to its "language, at the same time natural and polished, correct and audacious". He is not sure that Irving possesses all the quiet pervasive charm of his predecessors—Addison, Steele, Goldsmith, and Johnson—but on the other hand he finds Irving more poetic, clearer, and more correct than his models. And while recognizing in him a worthy successor of these English essayists, he regards him as the first of the American essayists of the rank of Oliver Wendell Holmes, James Russell Lowell, and Charles Dudley Warner. Apropos of Irving's humor, M. Rosenzweig says that it is much superior to that of Bret Harte, Artemus Ward, and Mark Twain. For these reasons, he adds, the English consider him a "master and a model", and he thinks it not the least of the merits of the *Sketch-book* that it gave Charles Dickens the inspiration for many pages of his *Chimes* and of his *Christmas Carol*.

M. Haussaire likewise praises Irving's humor, saying that his natural good sense prevents him from falling into the gross caricature which is the pitfall of this kind of writing. Like M. Rosenzweig, also, he sees in him the descendant of the great writers of the seventeenth and the eighteenth centuries, especially of Addison, Steele, and Goldsmith. But Irving possessed one quality, he affirms, that is not to be found in his masters, a genuine love of nature. This quality is to be attributed, he thinks, to the influence of the poets—Gray, Cowper, Coleridge, Wordsworth, and Scott. In the judgment



of M. Haussaire, Irving was not an original genius. "He invented nothing," he says, "but he rejuvenated a branch of literature already old, by the attention he gave to detail, by the boldness of his stroke, by the exquisite grace of his form, and, above all, by the accuracy of his observation." Like many others, M. Haussaire thinks that Irving's observation is at fault only when he looks at England. He complained that Irving "does not go to the bottom of his subject, and still less around it".

M. Fiévet, like M. Haussaire, notes Irving's "exquisite feeling for nature", and to it ascribes much of the charm of his writings. He does not consider him a thinker, nor even a very profound observer. "He contents himself with observing, or rather with allowing his artist's soul to dream," he says, "without effort, generally without intent to study, guided merely by his love of the beautiful and the picturesque." It is in this capacity for becoming completely absorbed in revery, thinks M. Fiévet, that Irving's talent consists. "His revery," he says, "is for him what the picture is to the painter, melody to the musician: it steals upon him, ravishes him, it is his joy, it is the life of his soul, it takes form and color thru a secret process of elaboration, like the flower in the calyx, and it is only at the moment when it has become a type of beauty that it issues forth, so to speak, from itself, and blossoms in the full light of day. Thanks to this natural endowment Irving was able to give so felicitous, so new a form to well-worn themes. It is this gift which is his veritable originality and which enabled him, while following in the footsteps of the English classics, Addison and Goldsmith, to remain nevertheless himself and to add a model to those whom he had imitated."

### III. SYNTHESIS OF APPRECIATIONS

**Irving's Mental Faculties.** Having taken note of the more important observations contained in the most noteworthy French appreciations of Irving, arranged chronologically, let us now examine the whole body of French criticism of him, or rather all of it that we have been able to discover, with a view to ascertaining the concensus of French opinion on some of the questions that naturally arise in connection with the study of any man of letters, such as his place in literature, the extent of his originality, the elements that go to make up his talent, his mental organization, etc.

First, what was the character, according to French critics, of Irving's emotions, of his imagination, of his observation, and of his judgment?

The sincerity of Irving's emotions has been repeatedly noticed. "In the *Sketch-book*," says M. Haussaire, "we find pages vibrating with an emotion that makes no attempt at concealment." In his introduction to *Vie et Voyages de Christof Colomb* (1876), M. Sedley speaks of the "quiet, profound, and genuine emotion of the *Sketch-book*". And he adds, a little farther on: "The pathos comes more directly from the heart than that of Sterne, in whose writings truth is often rendered less beautiful by affectation." Another quality frequently ascribed to Irving's emotions is gentleness, or mildness (*douceur*). Commenting on *Bracebridge Hall*, M. Fiévet says: "The reader would find in it that exquisite gentleness of feeling, etc." This quality has been noted both in his sadness and in his mirth. "His works are marked by grace and gentleness," writes M. Quesnel<sup>10</sup>; while another critic, M. Mézières,<sup>11</sup> asserts that his writings are "full of gentle, kindly mirth". His kindness of heart has been frequently mentioned. "He is kind-hearted," says M. Milne,<sup>12</sup> "that is the secret of our liking for him." M. Fontaney calls him an "amiable soul" and speaks of his habit of "sympathetic observation"; M. Ollife<sup>13</sup> says that in the *History of New York* "we frequently light upon pages full of the tender and the pathetic"; while in the estimation of M. Fiévet, "tenderness of emotion" is one of his master qualities (p. ix). Several critics have spoken of his love of nature. "Do you like the simple sweet emotions that the study of nature brings?" asks M. Sachot. "Then read in the 'Birds of Spring' [in *Wolfert's Roost*] the delightful pages devoted to the story of the bobolink" (p. 385). "He has a genuine love for nature, a feeling for it, one may say the sensation of it," says M. Haussaire (p. 11); while M. Fiévet, as we have seen, attributes much of the charm of his writings to this personal characteristic. Irving's religious nature has not been dwelt upon. One critic, however, M. Rosenzweig, has noted it in "The Broken Heart" and in "The Widow and Her Son", which bear witness, he says, to the novelist's "sensitive and religious imagination" (p. viii).

The dreamy character of his imagination, exhibited in his capacity for prolonged and fruitful revery, has been pointed out by M. Fiévet. Its tendency toward the fantastic was noticed by M. Sachot, who wrote: "But if you enjoy fantastic tales, oh! you will be served according to your desire: choose among 'The Adalantado of the Seven Cities', 'The Engulphed Convent', 'The Grand Prior of Minorca', and a dozen other legends or reminiscences of history" (p. viii). The

<sup>10</sup> *Nouvelle revue*, May 1, 1882, p. 125.

<sup>11</sup> *Mémoires de l'Académie de Metz*, 1856.

<sup>12</sup> Introduction to *Life and Voyages of Columbus*, 1886, p. 7.

<sup>13</sup> Preface to *Extracts from Washington Irving*, 1843, p. 104.

poetic power of his imagination is seen by M. Rosenzweig in "Westminster Abbey" and in "The Journey" (p. viii); M. Fiévet also speaks of its "capacity for prolonged and lofty flight" (p. xiv):

His observation is said to be, first of all, honest. "One of the characteristic marks of his talent," said M. Haussaire, "is honesty (*franchise*)" (p. 11). It is also said to be exact. Speaking of the *Sketch-book* this same writer says: "In it we find many details, the result of direct observation, not one of which can be criticised" (p. 11). Philarète Chasles<sup>14</sup> thinks the accuracy of his observation worthy of Teniers or of Wouvermans. As to its depth, there is a difference of opinion. M. Rosenzweig calls Irving a "sagacious observer" (p. viii); M. Samuel<sup>15</sup> calls him a "profound observer", and M. Sedley declares that the fictions of the *Alhambra* show "penetrating observation of real life" (p. xvii). On the other hand, M. Fontaney decides that it is "sometimes superficial and incomplete, perhaps" (p. 517); and M. Fiévet affirms that Irving "is not a profound observer" (p. xiv).

Concerning his judgment there is almost perfect agreement. "The author has a great deal of common sense," says an anonymous writer. "His essays are fundamentally reasonable," says a contributor to the *Revue encyclopédique*.<sup>16</sup> "His own views of mankind and human events are founded on reason and common sense," asserts M. Ollife (p. ix). "In his simple narration of the dreams of the oriental imagination [in the *Alhambra*], he betrays a great fund of common sense," says M. Sedley (p. xv). On this point L'Abbé Julien writes as follows: "These pages cause to pass before our eyes . . . reflections bearing the right stamp."<sup>17</sup> "Irving continues, in America, the English school of common sense," declares Remy de Gourmont.<sup>18</sup> His good taste no less than his common sense shows a discriminating use of judgment. "He is a pleasing story-teller possessing good taste," says Fontaney (p. 9). "He is a man of taste and attainments," writes Philarète Chasles.<sup>19</sup> M. Haussaire declares that "Irving is always, both in expression and in thought, a writer of good taste" (p. 13). L'Abbé Julien is the only one of Irving's French critics who has any fault to find with him on this score. "Sometimes Irving lacks reserve," he says, "and goes out of his way to slip in a thrust at Catholicism" (p. vii).

**His Talent.** According to French critics Irving is not merely a story-teller—his talent is many-sided. In the first place, they say,

<sup>14</sup> *Etudes sur la littérature des Anglo-Américains*, (1851) p. 47.

<sup>15</sup> *Grande Encyclopédie*, 1895.

<sup>16</sup> "A. M.", in *Revue encyclopédique* XLIX (1831), 625.

<sup>17</sup> Notice in *Sketch-book*, 1885, p. 7.

<sup>18</sup> *Revue suisse*, April and May, 1887, p. 9.

<sup>19</sup> *Revue des Deux Mondes*, April 15, 1841, p. 309.



either positively or by implication, that he is a painter. We frequently find, in their writings, such expressions as "charming descriptions", "the most brilliant descriptions", "exquisite pictures". Saint-Fargeau maintains in his *Revue des romans* (1839, p. 354) that Irving's descriptive talent sometimes rises to the height of that of Cooper. The fidelity of his descriptions of nature is recognized quite generally, but his portrayal of manners has not been considered so successful. Following are a few illustrations: "Not only is he able to see but he conscientiously reproduces what he sees."<sup>20</sup> "In his writings you find pictures that are restful and true."<sup>21</sup> "Washington Irving has written admirable sketches of English and American life."<sup>22</sup> "You can really see the landscape that the author is describing."<sup>23</sup> Note also the following concerning his portraits: "these portraits so carefully drawn",<sup>24</sup> "The personages live and move before your eyes, each one in his individual dress and character."<sup>25</sup> On the other hand, his paintings of old English customs have been called "strained" and "flattering". Fontaney thinks that Irving's appreciation of Spain and its customs was fairly good even if he did not fully comprehend its poetic aspects (p. 517). One critic (anonymous) has even claimed that Irving was not fortunate enough to understand his own country.<sup>26</sup>

It is asserted, in the second place, that Irving is a historian, even in his works of fiction. In the words of M. Milne, "the antiquarian shows thru the artist" (p. vii). This phase of his talent is first shown, according to M. Eyma, in *Bracebridge Hall*. "If Irving has not yet the right to call himself a historian," he says, "he is no longer exactly a novelist" (p. 668). He finds that in the tales of the Alhambra, the historical aspect of Irving's talent is still more marked. "In these stories," he says, "Washington Irving strives, as he always does, to be a true historian and nothing but a historian" (p. 676). Another says, "His works are neither exactly novels nor history."<sup>27</sup> If, however, one may consider the estimate recorded in the *Grande Encyclopédie* as a faithful reflection of French feeling concerning this point Irving "is to be counted a *littérateur* rather than a historian."

Several writers have affirmed that Irving is also a poet. "His temperament is essentially poetic," says M. Samuel in the *Encyclopédie* mentioned above. "In 'Rural Funerals'," says M. Haussaire, "you

<sup>20</sup> Milne, p. vii.

<sup>21</sup> *Critique française*, p. 398.

<sup>22</sup> Bourgeault, *Histoire des littératures étrangères* (1876), 237.

<sup>23</sup> Sedley, p. xvii.

<sup>24</sup> Fiévet, p. xii.

<sup>25</sup> Sedley, p. xvii.

<sup>26</sup> *Globe*, 1827, p. 415.

<sup>27</sup> Quesnel, p. 125.



feel a current of poetic revery" (p. 35); "The Angler' and 'Rural Life in England' are pictures full of freshness or poetic feeling for nature";<sup>28</sup> the tales of the Alhambra constitute a "poetic journey," says Saint-Fargeau (p. 354); while Quesnel asserts that "His works are almost all poems in prose" (p. 125).

It has been claimed also that he is something of a moralist. In the *History of New York*, "points of view full of morality" have been found.<sup>29</sup> According to M. Mézières, Cooper is a novelist while Irving is a moralist (p. 362). It has been pointed out that sometimes the moralist is almost invisible. "In the most amusing and most grotesque scenes [of the *Sketch-book*] are concealed the teachings of a sage."<sup>30</sup> "The *Sketch-book*," in the judgment of "E. D.," "is a series of sketches and essays which breathe the most wholesome morality" (p. 523). Still another, "T. C.," finds that his paintings "bear the impress of that serene morality which makes him comparable, in certain respects, to Bernardin de Saint-Pierre" (p. 398). Sometimes, on the other hand, the moralist is too much in evidence and draws upon himself the reproach of being "too paternal."<sup>31</sup>

An element of satire has also been observed in him, light, playful, or vigorous. "The Legend of Sleepy Hollow" is said to be "permeated with delicate, very delicate satire of the political manners of the times";<sup>32</sup> in "The Art of Book-making" and "Little Britain," there have been discerned the "charms of a playful, mocking imagination";<sup>33</sup> in "The Art of Book-making" and "The Country Church," it shows itself, according to M. Fiévet, "light and amusing" (p. v), while in the *History of New York* it is "rather vigorous".<sup>34</sup> His satire is said to be distinguished especially for its kindliness. The *History of New York* is a "playful and very kindly satire of contemporary manners and government," says M. Sedley (p. viii). "It is a satire," declares M. Haussaire, "that likes to scratch but never bites nor insults" (p. 13). The *Grande Encyclopédie* describes him as "a critic without bitterness or anger".

Finally, he is recognized as a humorist. "The Legend of Sleepy Hollow" is a "fanciful sketch of irresistible humor," says M. Haussaire; M. Milne characterizes the *Tales of a Traveler* as "humorous and fantastic stories" (p. ix); in the *History of New York*, styled a

<sup>28</sup> Fiévet, p. v.

<sup>29</sup> *Globe*, 1827, p. 415.

<sup>30</sup> Sedley, p. vii.

<sup>31</sup> Gourmont.

<sup>32</sup> Haussaire, 13.

<sup>33</sup> Rosenzweig, p. viii.

<sup>34</sup> *Globe*, 1827, p. 415.

"veritable mock-heroic epic", the humor is said to be "worthy of Swift, of a Swift deprived, of course, of his bitterness";<sup>35</sup> the *Sketch-book*, the *History of New York*, and *Bracebridge Hall* are "three masterpieces of humor", says Odysse Barot in his *Littérature contemporaine en Angleterre* (p. 217). Attention has been called to the fact that Irving's fantastic tales, unlike those of Poe, are robbed of their terrors by the humor which envelops them. "His amiable ironical smile," writes Emile Lauvrière, in his treatise on *Poe, His Life and His Works*, "is as fatal to their element of terror as a bright ray of sunlight is to stormy clouds" (p. 509).

Irving's French critics think, for the most part, that thanks to his good sense and his good taste his humor almost always avoids the fault of exaggeration, for, altho Fontaney thinks that the humor of *Bracebridge Hall* is "extravagant" and another says that some of his sketches "border too closely on caricature",<sup>36</sup> many others judge that he maintains a reserve that is admirable.

**His Art.** The artistic quality of Irving's writings has been frequently noted: "The *Sketch-book* shows us an artist behind the observer";<sup>37</sup> "We find the same love of picturesque detail";<sup>38</sup> "He admires and loves the beautiful in all nature—in characters, in history, in legends—he is an enthusiastic artist."<sup>39</sup> Even in its smallest details his work betrays the artist—"One may say that each part [of the *Sketch-book*] is chiseled and cut with infinite art." Apropos of the same book, M. Haussaire says: "These notes, before being given to the public, had been reviewed, arranged, corrected, and chiseled with the care of an artist and a lover of letters" (p. 8); and farther on; "He has rejuvenated a *genre* already old by . . . the delicacy and the polish of the details" (p. 15). M. Sachot affirms that the chronicles of *Wolfert's Roost* "offer a series of curious legends . . . and all related with . . . that talent for arrangement possessed in such perfection by the author of the *Sketch-book*" (p. 385). His art is especially noticeable, according to "E. D.", in his selection of materials. "The art with which the author has chosen from among the emotions experienced by a traveler on the continent, those that were not common," he says, "is precisely what makes the charm of his book" [the *Sketch-book*].<sup>40</sup>

In this connection may be mentioned the tribute paid by French

<sup>35</sup> Flévet, p. viii.

<sup>36</sup> "F. A. S.", *Globe*, 827, 174.

<sup>37</sup> Rosenzweig, p. viii.

<sup>38</sup> Haussaire, 11.

<sup>39</sup> Milne, p. vii.

<sup>40</sup> *Globe*, 1827, p. 523.

critics to his simplicity of construction and to the merits of his style. Apropos of the *Tales of a Traveler*, the same author writes: "His stories are simple; the author has purposely refused to complicate them with events in order that the whole interest may result from the manner in which they are told" (p. 522). M. Ollife maintains that "there is not a single page of the numerous writings of the accomplished American that does not teem with fragrant flowers of diction and is in every respect a model of literary composition".<sup>41</sup> It is a style which is often characterized by the word *charming*, sometimes even by the word *magical*.

Among the merits of his style, those most frequently mentioned are grace and delicacy. It has been said, for example, that in his works of imagination and fancy there is "an exquisite grace";<sup>42</sup> that "he is the most elegant writer in America";<sup>43</sup> that "he is a model of elegant, graceful diction";<sup>44</sup> that his style is "as elegant as that of Addison and of Goldsmith".<sup>45</sup> M. Champion affirms that "the delicacy of his talent contributed not a little to his success in France".<sup>46</sup>

It is characterized also, according to some of his critics, by fluency and simplicity. The *Alhambra* is said to be a "model of fluent simple narration";<sup>47</sup> "the legends of *Wolfert's Roost* are all written with that facility of diction which characterizes the author of the *Sketch-book*";<sup>48</sup> "No one appreciates more fully than we do the excellence of this style without pretension and without exaggeration."<sup>49</sup> Remy de Gourmont is inclined to believe that he carries simplicity to excess: "Like his too paternal morality," he says, "his pure style is simple to the point of nudity—there is nothing to catch your attention in passing" (p. 11).

Closely related to this quality of his style is the quality of sobriety, which it is likewise said to possess. "Irving always maintains this moderate tone," says Gourmont (p. 11); while M. Eyma credits him with preserving "an exquisite medium between smiles and tears" (p. 659).

The harmoniousness of his sentences has often been mentioned: "His prose [in the *Sketch-book* and *Bracebridge Hall*] is, so to speak, rhythmical and needs only the aid of the voice to become music";<sup>49a</sup>

<sup>41</sup> Preface to *Extracts from Washington Irving*, p. vii.

<sup>42</sup> Eyma, 657.

<sup>43</sup> Roche (Antoine) *Ecrivains anglais au dix-neuvième siècle* (1869), 158.

<sup>44</sup> Sedley, p. xv.

<sup>45</sup> "E. T.", *Globe*, 1825, p. 395.

<sup>46</sup> Champion (G. Hardinge), *Etudes littéraires* (1849), 201.

<sup>47</sup> Sedley, p. xv.

<sup>48</sup> Sachot, 385.

<sup>49</sup> Chasles, p. 44.

<sup>49a</sup> Sedley, p. xvii.



"he is very careful to produce harmonious sentences";<sup>50</sup> "these harmonious periods, which as they unfold give the impression of the most beautiful poetry,"<sup>51</sup> etc.

His vocabulary is remarkable, it is said, for its richness. "He possesses a vocabulary of great extent which permits him to constantly vary his expression," says M. Milne (p. vii); M. Rosenzweig asserts that it is "as rich as it is varied" (p. x). No other modern author, according to M. Milne, makes more frequent use than he of compound words (p. vii).

The only fault that has been found with Irving's style is that it lacks virility. M. Chasles thinks that a certain degree of weakness is visible in it.<sup>52</sup> M. Rosenzweig, on the other hand, seems to think that Irving was able "to combine grace with vigor" (p. xi).

**His Originality.** On the question of Irving's originality, his French critics are neither agreed one with the other nor consistent with themselves. Some of them have declared that he was absolutely devoid of originality. Fontaney, for example, writes as follows: "The more attentively one studies him the more clearly one perceives the complete absence of originality in him. He has perfect command of four or five manners that he has borrowed—he has not one of his own" (p. 548). M. Haussaire says that "he has invented nothing" (p. 15). One of the critics of the *Globe*, "E. D.," regrets that Irving, unlike Cooper, did not try to write an original work (p. 523).

He is charged with being too much preoccupied with England. "Towards England alone all his thoughts are turned," says M. Chasles, "he renders it a singular superstitious homage" (p. 45). M. Quesnel says on this point: "Altho the independence of letters in the United States is supposed to date from Washington Irving, Irving was still English" (p. 123). According to M. Rosenzweig it was for the purpose of instructing those who had not studied John Bull in his own home that Irving wrote the greater part of the *Sketch-book* (p. viii). It has been asserted even that his success is due, in large measure, to English influence. M. Chasles declares that "he owes his celebrity, not to flights of imagination, to creative thought, to a wide reach of intelligence, but to a graceful imitation of the older English literature" (*Etudes*, p. 44).

It is especially Goldsmith and Addison who are thought to have been his models. One of his earlier French critics declared that he had chosen them as models ("E. T.," p. 395), and since then the state-

<sup>50</sup> Haussaire, 11.

<sup>51</sup> Fiévet, p. xii.

<sup>52</sup> *Etudes*, 44.



ment has been repeated again and again. Out of thirteen writers who have endeavored to ascertain Irving's literary origins, eight have mentioned the influence of Goldsmith and seven that of Addison. He "copies" them, he "imitates" them, he "continues" them, he "resembles" them, he has "taken them for his model", he "proceeds from them", he is of their "school", he is their "disciple", etc., etc. Then come Mackenzie, Sterne, Steele, and Swift, the first of whom is mentioned in four articles, the second in three, and the remaining two in two articles. According to M. Chasles, Robertson was one of his masters (p. 309); according to M. Rosenzweig, he was one of the "worthy successors" of Johnson (p. x). M. Milne thinks that "he recalls Bacon, Milton, and their contemporaries" (p. vii), M. Buchner calls him "the Dickens of America",<sup>53</sup> and M. Haussaire sees in his love of nature the influence of the English poets (p. 11). "E. D." is reminded, by the *History of New York*, of Rabelais, and M. Fontaney finds in the *Alhambra* something of the delicate humor of Lesage, also a little of the caustic joviality of Cervantes (p. 548).

On the other hand, we have some testimony tending to show that he did possess originality. Note for example the following taken from an article in the *Globe*: "One may say that since Sterne there has appeared nothing more piquant and more original."<sup>54</sup> The following is found in the *Etudes* of M. Chasles (p. 50): "With Irving appears the first gleam of real originality of which American literature can boast." M. Haussaire asserts that Irving succeeded in rejuvenating a "genre that was already old" (p. 15), and M. Milne declares that he created a *genre*, the sketch (p. vii). He rejuvenated a *genre*, says M. Haussaire, "by the exactitude of his observation—a thoroly modern quality—by the delicacy and finish of his detail, by the boldness of his stroke, by the polished grace of his form" (p. 15). "It is in his way of saying things," he adds, "that his originality consists." Finally M. Fiévet affirms that Irving "succeeded in giving a new form to well-worn themes, thanks to a remarkable gift of revery", and maintains that it is in this gift that his real originality consists (p. xiv).

**His Masterpieces and His Place in Literature.** Among Irving's imaginative works, the best beyond all question, if we accept the verdict of a majority of those who have expressed an opinion on this point, is the *Sketch-book*. Note the following: "It is a charming book";<sup>55</sup> "It is a model of its kind";<sup>56</sup> "Some parts of it will remain,

<sup>53</sup> Buchner (A), *Revue des Cours littéraires*, May 23, 1868, p. 407.

<sup>54</sup> "E. D.", in *Globe*, 1827, p. 523.

<sup>55</sup> Rosenzweig, p. viii.

<sup>56</sup> Milne, p. vii.

as it were, masterpieces of grace, sensibility, and style";<sup>57</sup> "It is one of the best works that have come from his pen";<sup>58</sup> "It is his masterpiece".<sup>59</sup>

The favorite sketch in the collection is "Rip Van Winkle". M. Haussaire styles it "that little masterpiece of imagination" (p. 131), while M. de Gourmont declares that "Irving has never been more successful than in 'Rip Van Winkle'" (p. 10). "The Legend of Sleepy Hollow" is also singled out for special praise. It is a "fanciful sketch of irresistible humor . . . as amusing as a tale from the *Arabian Nights*".<sup>60</sup> In the judgment of "E. D.", "Stratford-on-Avon", "The Country Church", and "The Widow and Her Son" are the most distinguished portions of this book (p. 523).

The *Alhambra* has also been much admired. M. Eyma even asserts that the book is a "masterpiece" (p. 676), while M. Sedley claims that "these tales are as interesting as the fairy tales of our childhood" (p. xv), and M. Fontaney that "Washington Irving excels in *tableaux de genre* and that the *Alhambra* is a gallery of pictures of this kind (p. 517).

Of the *Tales of a Traveler* it has been said that this book is a "series of charming sketches",<sup>61</sup> that it "should be classed among his most pleasing works",<sup>62</sup> and that "it is a model of thought and style".<sup>63</sup>

Concerning *Bracebridge Hall*, there is a difference of opinion. Eyma, Chasles, and Haussaire speak well of it, while "E. D." declares that "it is sometimes tiresome and never of a superior merit" (p. 522).

As to the *History of New York*, the difference of opinion is still more marked. Fontaney thinks it the "most witty and the most piquant of his works" (p. 517). M. Barot calls it a "masterpiece of humor",<sup>64</sup> and M. Chasles ranks it with his "most pleasing works".<sup>65</sup> To offset these judgments we have the following: "The laughter in it is that of an author who is sure of success; there is something provincial in his self-assurance—he is the oracle of a small group."<sup>66</sup> "This satire is not very intelligible for us Europeans. . . . Whatever may be the size of the principal cities in America, they contain so few people of culture that those who really are superior possess all the

<sup>57</sup> Eyma, 667.

<sup>58</sup> Julien, p. vii.

<sup>59</sup> Ollife, p. xviii.

<sup>60</sup> Haussaire, 13.

<sup>61</sup> Eyma, 668.

<sup>62</sup> Chasles, *Etudes*, 48.

<sup>63</sup> Haussaire, 7.

<sup>64</sup> *Littérature contemporaine en Angleterre* (1874), 217.

<sup>65</sup> *Etudes*, 48.

<sup>66</sup> "E. D.", in *Globe*, 1827, p. 522.

self-assurance of the inhabitants of our country towns. Whence comes a heavy and pretentious tone which the author of the *History of New York* can not throw off. One can see he is sure of producing laughter."<sup>67</sup> M. Sedley likewise thinks the work is too American to keenly interest Europeans (p. viii).

As to his place in American literature M. Chasles declared in 1841 that "he was the best writer in America",<sup>68</sup> which of course was not at that time saying a great deal; and M. Eyma said, in 1846, that he had "created a literature in America" (p. 569). Others divide this honor between Irving and Cooper. "A. M." for example, says in the *Globe* that Washington Irving and Cooper are for him the two transcendent geniuses of the United States,<sup>69</sup> while M. Moreau states, in the *Grande Encyclopédie*, that, with Cooper, Irving is "one of the initiators of American literature". Still others rank him below Cooper. Fontaney, for example, asserts that "Washington Irving is a man of less importance than Cooper" (p. 517), while M. Loménie believes that Irving's talent, occupying itself with subjects already exhausted for us, is much inferior to the talent of Cooper (p. 8). M. Milne declares that he is a "writer of the first order and that he deserves one of the first places among classic authors" (p. vii).

His influence is apparent, it is claimed, on both sides of the Atlantic. According to M. Barot he was imitated by Thomas Haliburton (p. 217); according to M. de Gourmont, he is the "ancestor of American humor" (p. 58). In England he is considered, says M. Rosenzweig, "as a master and a model", and it is not the least of the merits of the *Sketch-book*, says the same authority, that it has furnished Dickens the inspiration for certain portions of some of his best stories.

**Summary.** To sum up, Irving's sensibility, as revealed in his works of fiction, is characterized, according to his French critics, by profound sincerity, sobriety, and tenderness. His imagination, habitually light, dreamy, and inclined toward the fantastic, is at the same time capable of lofty flights. As an observer, he is honest, accurate, and discriminating, but perhaps not very profound. His judgment is sound and his taste good. His talent is complex. He is in the first place a painter. His descriptions of nature are exact and his portraits lifelike, but his pictures of manners, especially those of English manners, are somewhat overdrawn. In the second place, he is a historian, but not so much a historian as a *littérateur*. He is also

<sup>67</sup> *Globe*, 1827, p. 415 (anonymous).

<sup>68</sup> *Revue des Deux Mondes*, 15 April, 1841, p. 309.

<sup>69</sup> *Globe*, 1831, p. 625.



more or less of a poet, and, to a certain extent, a moralist as well, sometimes too paternal a moralist. His satire is delicate, playful, kindly, distinguished, and his humor never indulges in exaggeration. Furthermore, he is a finished artist. His art shows itself in his happy choice of subjects, in the simplicity of his composition, and in the excellence of his style, which seems almost beyond criticism. It is characterized by grace and delicacy, by fluency and simplicity, by sobriety, by harmony, and by richness of vocabulary. The only defect found in it is a certain lack of vigor. In originality he was somewhat wanting. He worshiped English authors and chose as models Goldsmith and Addison. His works betray the influence of many other writers, most of them English. And yet he found means to preserve his own individuality. His success in France was such that it destroyed the prejudices held against American literature and caused his works to be studied in French schools. The best of his imaginative works is the *Sketch-book* and the best of his sketches is "Rip Van Winkle". The *Alhambra* and the *Tales of a Traveler* are likewise popular. The merits of *Bracebridge Hall* and of the *History of New York*, of the latter especially, are less generally recognized. As to his place in literature, he is put in the first rank of classic authors, and he is made to share with Cooper the honor of having created a literature in the New World.

#### IV. COMPARISON OF FRENCH VIEW WITH AMERICAN AND ENGLISH VIEW

A comparison of the French view of Irving, as set forth above, with that of his English-speaking critics shows that while on most points there is substantial agreement between them, there are nevertheless some noteworthy differences. His pathos, for instance, is not uniformly praised in America. George Parsons Lathrop affirms even that it is "always a lamentable failure". He adds: "If Irving had grasped the tragic sphere at all he would have shone more splendidly in the comic. . . . In this sketch ["Rip Van Winkle"] there is not a suspicion of the immense pathos which the skill of an industrious playwright and the genius of that rare actor, Mr. Jefferson, have since developed from the tale."<sup>70</sup>

The strictures placed by certain French critics upon the accuracy of his observations, notably in his descriptions of rural life in England, are surpassed in severity by those of certain of his American critics.

<sup>70</sup> *A Study of Hawthorne*, 304.



Alexander Everett, for example, apropos of the *Sketch-book* and *Bracebridge Hall* writes as follows: "We really cannot but wonder how Mr. Irving, so just and acute an observer of nature, should have failed so completely in seizing the true aspect of rural life in England, or why, if he saw it as it is, he should have given us an unreal mockery of it, instead of a correct picture." His contention is that Irving represents the British aristocracy in a light much too favorable, while he does not do the common people justice. "If there be in the known world," he continues, "an animal who by general consent of all who are acquainted with his habits, realizes the idea of complete *puppyism* and is, in the strictest sense of the term, *insupportable*, it is the young Englishman of rank and fortune";<sup>71</sup> and he cannot refrain from making the comment that was made of Cooper on the publication of the *Bravo*, and of Poe apropos of "The Murders in the Rue Morgue", the scenes of which are laid in foreign lands, namely that "he would have done better to stay at home". One can understand that French critics in 1827 should have been unable to do justice to England—it is less comprehensible that an American in 1835 should have spoken of the English nobility with such bitterness. As a matter of fact Mr. Everett's view was not the prevailing one among American critics, and it goes without saying that in England Irving's descriptions of English manners and customs were looked upon as evidence that the author possessed remarkable powers of discrimination.

Irving's American and English critics, like those of France, are practically unanimous in crediting him with good taste and sound judgment. They are also in agreement with them in regard to the complexity of his talent. The former, however, have gone farther than the latter in describing his talent, in that they have essayed to point out its dominant element, some claiming that he is essentially a sketcher, a miscellanist, others that he is fundamentally a novelist. Again, some of Irving's English-speaking critics contradict the assertion that his moralizing was too paternal, one of them declaring even that it was "always unconscious". While not quite so sure as his French critics that "his humor never exaggerates", they admit that his satire is always innocent of bitterness. As to his style, which has been so highly praised in France, they are not in perfect agreement among themselves. All agree that it possesses rare delicacy, fluency, and grace, but some are of the opinion that the constant display of these qualities is itself a fault. Thus, Francis Lord Jeffrey writes: "The great charm and peculiarity of this work [*Bracebridge Hall*] consists in the singular sweetness of the composition and the

<sup>71</sup> *North American Review*, XXVIII, 122.

mildness of the sentiments,—sicklied over, perhaps, a little now and then, with that cloying heaviness into which unvarying sweetness is too apt to subside. The rhythm and melody are certainly excessive. It gives an air of mannerism.”<sup>72</sup> Mr. C. F. Richardson expresses himself in like manner in his *American Literature* (I, 271), where he says: “His refinement of style was somewhat excessive, and his readers never completely lose sight of the rhetorician manipulating the printed words.” Edgar Allan Poe goes still farther: “Few of our writers are guilty,” he asserts, “of more frequent inadvertences of language. In what may be termed his mere English he is surpassed by fifty writers whom we could name.”<sup>73</sup>

Originality, as a quality of Irving’s fiction has been more widely recognized in America than in France or even in England. The works which are thought to reveal this quality most clearly are the *History of New York* and the *Sketch-book*. In the *North American Review* (XXVIII, 103), Alexander Everett argues that the hitherto unaccomplished feat of establishing a purely American literary reputation of the first order implies “not merely taste and talent but *originality*, the quality which forms the real distinction, if there be one, between what we call *genius* and every other degree of intellectual power”. The character of Diedrich Knickerbocker, in his opinion, affords conclusive proof that its creator possessed originality. Discussing the humor of the *Sketch-book*, Bryant asserted in his discourse on Irving, delivered in 1860, that it “shows the same peculiar and original cast” of that of the *History of New York*, “wholly unlike that of any former author”.<sup>74</sup> John Neal, unlike most English critics, who are prone to see in Irving a reflection of their own writers, Addison, Goldsmith, and others, was deeply impressed by Irving’s originality. Apropos of the *History of New York*, he says: “We look upon this volume . . . as a work so *altogether original*, without being extravagant, as to stand alone among the labors of men.”<sup>75</sup> And in the *Sketch-book* he discovers a “world of humor, so happy, so natural, so altogether unlike that of any other man, dead or alive,” that he would rather have been the writer of it, fifty times over, than of every other thing that he wrote.<sup>76</sup>

The extent of Addison’s influence upon Irving is thought by Edward Everett to have been exaggerated. “Mr. Irving’s manner is often compared with Addison’s,” he states, “though, closely examined, there is no great resemblance between them except that they both

<sup>72</sup> *Edinburgh Review*, IV (1822), 213.

<sup>73</sup> Poe, *Works* (Ed. Stedman and Woodberry), IX, 229.

<sup>74</sup> Bryant, *Prose Works*, I, 347.

<sup>75</sup> *Blackwood’s Magazine*, XVII (1825), 61.

<sup>76</sup> *Ibid.*, 64.

write in a simple, unaffected style. Addison had received a finished classical education, was eminently a man of books, and had a decided taste for literary criticism. Mr. Irving, for a man of letters, was not a great reader, and if he possessed the critical faculty, never exercised it. Addison quoted the Latin poets freely—Mr. Irving made no pretensions to a familiar acquaintance with the classics. Addison wrote some English poetry, which Irving, I believe, never attempted. One deep chord in the human heart, the pathetic, for whose sweet music Addison had no ear, Irving touched with the hand of a master." As miscellaneous essayist, Everett thinks "Irving exceeds Addison in versatility and range quite as much as Addison exceeds Irving in the far less important quality of classical tincture."<sup>77</sup>

Some of Irving's books have been much more popular in America than in France. *Salmagundi*, which, altho not wholly a product of his pen, is usually included for purposes of criticism among his works, was never thoroly enjoyed in France, but was, on the contrary, highly appreciated in our own country, as the following statement made by Alexander Everett will show: "Take it altogether, it was certainly a production of extraordinary merit and was instantly and universally recognized as such by the public."<sup>78</sup> *Bracebridge Hall*, which likewise was not a favorite with Irving's French readers, was pronounced by Edward Everett, without hesitation, to be "quite equal to anything which that age of English literature had produced,—for accuracy and fidelity of observation, for spirit of description, for a certain peculiar pleasantry, and for uncommon simplicity and purity of style."<sup>79</sup> It is in respect to the *History of New York*, however, that the greatest divergence of opinion is to be noticed. As a rule it was not understood either by the French or by the English, Walter Scott being a striking exception to the rule. In America, on the contrary, it was read with the greatest delight. Edward Everett writes, in 1822, that it is "a book of unwearying pleasantry, which, instead of flashing out as English and American humor is wont, is kept up with a true French vivacity from beginning to end, a book which, if it have a fault, has only that of being too pleasant, too sustained a tissue of merri-ment and ridicule".<sup>80</sup> Many years later he affirmed that it had "probably been read as widely and with as keen a relish as anything from Mr. Irving's pen".<sup>81</sup> E. P. Whipple has characterized it as "the

<sup>77</sup> Everett, *Orations and Speeches*, IV (1868), 251.

<sup>78</sup> *North American Review*, XXVIII (1829), 116.

<sup>79</sup> *Ibid.*, XV (1822), 208.

<sup>80</sup> *Ibid.*, XV, 206.

<sup>81</sup> Everett, *Orations and Speeches*, IV (1868), 249.



most deliciously audacious work of humor in our literature",<sup>82</sup> and Charles Dudley Warner says that "the book is indeed an original creation and one of the very few masterpieces of humor." As to the *Sketch-book*—it seems to hold a secure position, both for Irving's French and his Anglo-American critics, at the top of the list of his works, and "Rip Van Winkle", the same position in the list of his stories. More frequently singled out for praise in America than in France, however, are "The Wife", "The Pride of the Village", "The Broken Heart", "The Stout Gentleman", "Annette Delarbre", "Dolph Heyliger", and especially the "Spectre Bridegroom", and "The Legend of Sleepy Hollow".

Certain effects of Irving's works, observed by American critics, seem to have quite escaped the notice of French writers. It is now recognized, for instance, that Irving "started the vein of burlesque which has run through his country's literature, but under the restraint of temperance and culture that have unfortunately been discarded";<sup>83</sup> also, that "the American nation is indebted to him for investing a crude new land with the enduring charms of romance and tradition"; that the "Knickerbocker Legend and the romance with which Irving has invested the Hudson are a priceless legacy".<sup>84</sup>

<sup>82</sup> Whipple, *American Literature and Other Papers* (1876-86), 43.

<sup>83</sup> Nichol, *American Literature*, 173.

<sup>84</sup> C. D. Warner, *Atlantic Monthly*, XLV (1880), 404.



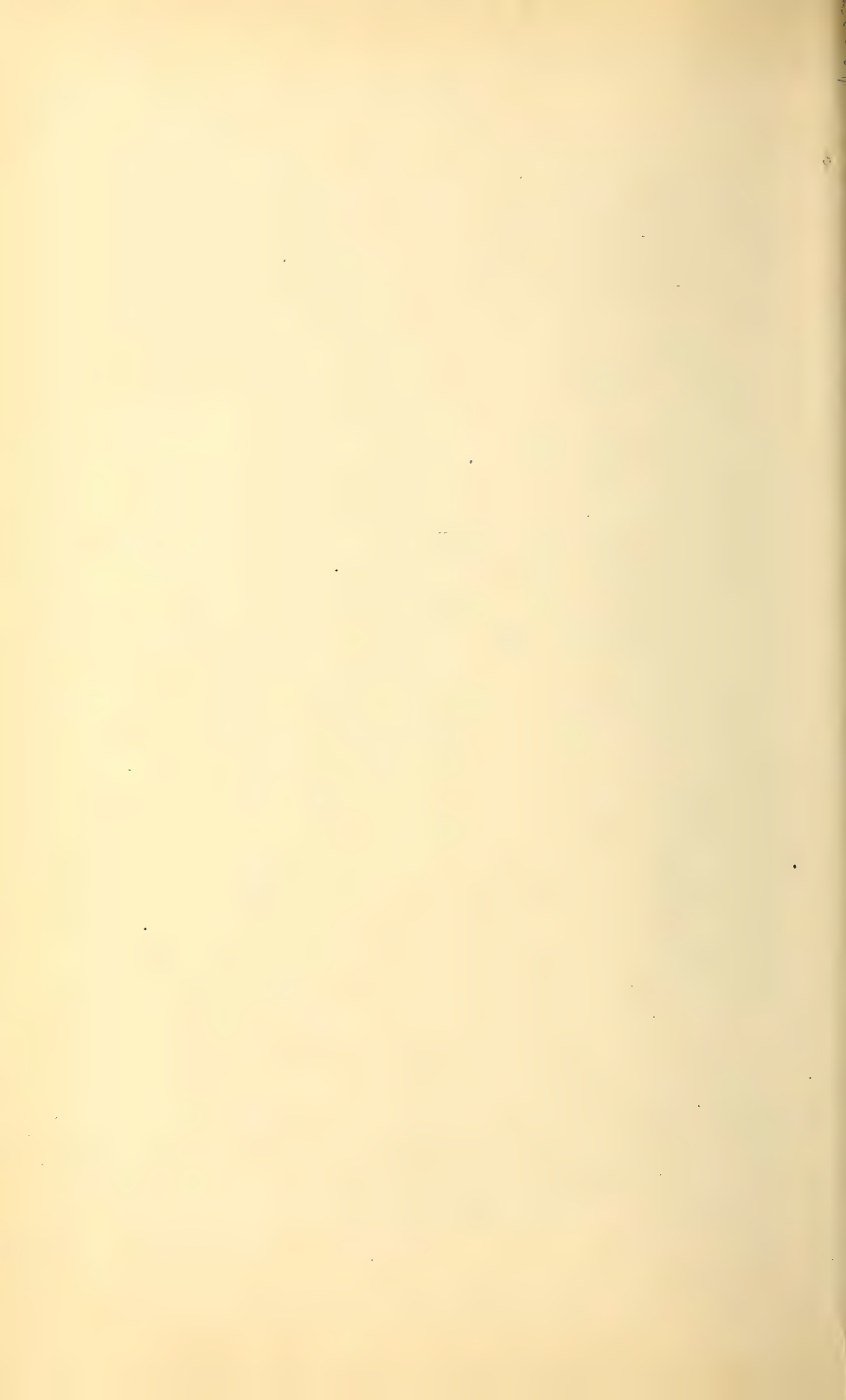
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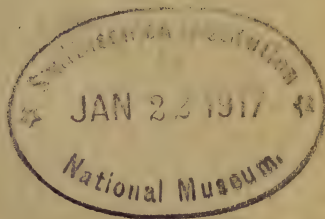


# INDIANA UNIVERSITY STUDIES



## Study No. 31

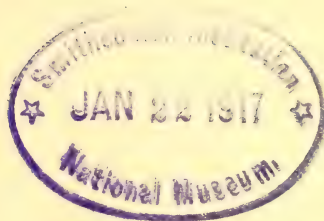
REPORT ON THE LAKES OF THE TIPPECANOE BASIN  
(Indiana). By WILL SCOTT, Ph.D., Assistant Professor of  
Zoölogy, Indiana University.



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**STUDY No. 31**

**REPORT ON THE LAKES OF THE TIPPECANOE BASIN**  
(Indiana). By WILL SCOTT, Ph.D., Assistant Professor of  
Zoölogy, Indiana University.

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## Report on the Lakes of the Tippecanoe Basin (Indiana)

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By WILL SCOTT, Ph.D., Assistant Professor of Zoölogy, Indiana University.

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### INTRODUCTION

The plan for the survey of the lakes of Indiana was formulated and the work initiated in the summer of 1912. The purpose of this survey was to collect types of data known to be fundamental in lake studies, and to undertake the investigation of special problems as they presented themselves in the course of the general studies.

The present paper presents the first section of the results of this investigation. The work has been carried on from the Indiana University Biological Station as a base. The lakes herein described are drained by the Tippecanoe river. This river is a northern tributary of the Wabash. Its drainage basin has an area of 1,890 square miles. The following counties are drained in part or wholly by the Tippecanoe river: Noble, Whitley, Kosciusko, Marshall, Fulton, Starke, Pulaski, White, Cass, Carroll, and Tippecanoe.

The most fundamental fact about a lake is its contour, i.e. its dimensions and form. These facts, plus its location and elevation, determine its summer distribution of heat.

The work of Birge and Juday (1911) on the Wisconsin lakes, and that of Brönstedt and Wesenberg-Lund (1911) on the lakes of Denmark, established the importance of dissolved oxygen, carbon dioxide, and carbonates in the economy of lakes, and the influence of thermal stratification upon their vertical distribution and availability.

Consequently the plan has been to construct a hydrographic map of each lake, to take the summer temperatures, and to determine the amount and distribution of the dissolved oxygen, carbon dioxide, and carbonates. In addition to this the plankton

was collected at critical levels. The particular glacial process which caused each lake has been determined whenever possible. Many of the lakes have been changed by drainage while others have been dammed. These facts and their influences have been noted and are briefly discussed in this paper. Part of these latter observations have been published (Scott, 1913).

Hydrographic maps have been constructed of the following lakes: Manitou, Beaver Dam, Yellow Creek, Palestine, Silver, Plew, Sawmill, Irish, Kuhn, Little Eagle (Chapman), Hammon (Big Barbee), Dan Kuhn, and Ridinger. The soundings for these maps have been recorded in meters and the contours drawn at two-meter intervals.

Previous to this survey, hydrographic maps of several lakes in this basin have been constructed. Some of these maps are inaccurate in places and the soundings are expressed in feet. However, it has been deemed advisable to map other lakes rather than correct these until more time and money are available. The lakes that have been so mapped are Webster, Tippecanoe, Pike, Center, and Eagle (Winona). In this list mention should be made of the map of Turkey lake, which, however, lies in the St. Joseph basin. For complete reference to these maps see the appended bibliography.

Gas determinations, temperature records, and collections of plankton have been made in the following lakes: Manitou, Yellow Creek, Center, Pike, Eagle (Winona), Little Eagle (Chapman), Tippecanoe, Plew, and Hammon (Big Barbee).

To avoid duplication, no work has been done on Lake Maxinkuckee. Various investigators of the United States Bureau of Fisheries have been studying this lake since 1899. An excellent map, unfortunately in English units, has been published by this Bureau. Juday (1911) has published a series of temperature and gas determinations from this lake. Except the descriptions of two new fish, no other publication of this work has appeared.

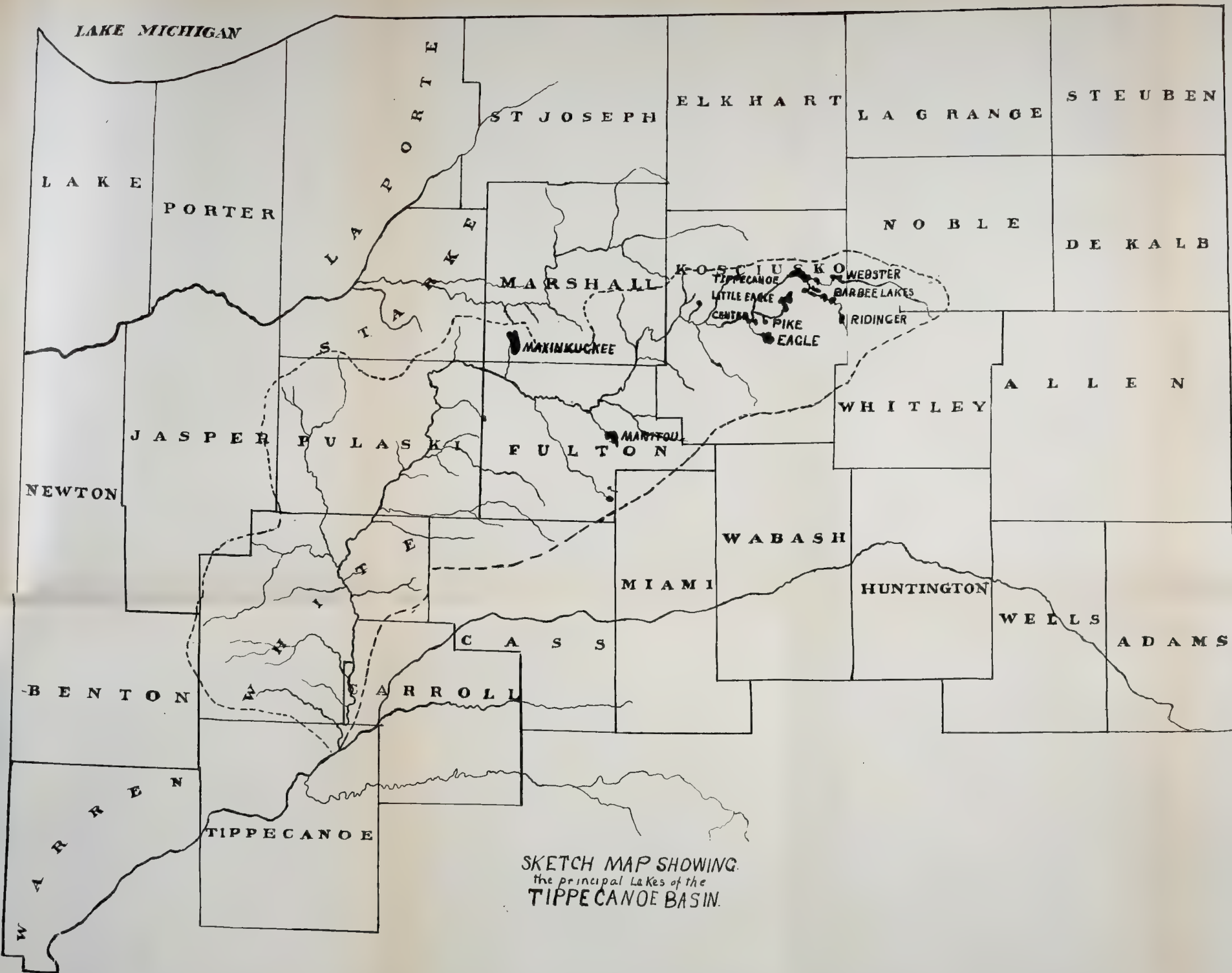
While the general survey has progressed thus far, the following special studies have been completed or are nearing completion: The Food and Feeding Habits of the Fresh-water Mussels, by W. R. Allen; The Food of the Daphnids, by H. G. Fisher; The Food of the Young Fishes of Winona Lake, by R. Enochs; The Fauna of the Oxygenless Region of Center Lake, by H. G. Imel; The Relation of the Nitrogen Compounds to the Production of the Various Littoral Associations in Winona Lake, by T. B. Rice. The first three of these are parts of the large problem of the food



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relations of all the animals in our lakes. This must be known before any scientific program can be undertaken to increase the productivity of particular forms.

### THE LAKE BASINS AND THEIR FORMATION

The lakes of northern Indiana are all due to the massive and uneven deposits of the Wisconsin ice sheet. In the lake region these vary from 100 feet to 300 feet in thickness.

This ice sheet advanced into the northeast part of the State in two well-defined lobes, the Huron-Erie and the Saginaw. The moraines, which record the main outlines of the advance and retreat of these two lobes, have been described in detail by Leverett (1902), Dryer (1889, 1892, 1894), and by Leverett and Taylor (1915). Between these two lobes the great Erie-Saginaw interlobate moraine was deposited. To the irregularities of this moraine practically all the lakes of Indiana are due. This moraine and consequently the lake region of Indiana extends from the northeast corner of the State in a southwesterly direction for about 100 miles. Its average width is between 25 and 30 miles.

Many of the glacial phenomena, such as the scouring of rock basins and the damming of preglacial valleys, that are often factors in the production of lakes, are wholly absent here. The lakes are the result of irregular deposits so typical of interlobate moraines.

The lake basins of this region are either "kettle holes", irregularities in the ground moraine, channel lakes, or a combination of these. Lingle, Yellow Creek, Beaver Dam, Eagle, and Center lakes are probably all kettle holes. Eagle lake lacks the regularity usually characteristic of a typical kettle hole, yet its depth makes it probable that its origin was due at least partially to this cause.

A large part of Lingle lake was the result of irregularity in the ground moraine, but the small circular depression near the north margin in which the maximum depth occurs is certainly a kettle hole.

Little Eagle (Chapman), Silver, Pike, and probably Ridinger's lakes are due simply to irregularities in the ground moraine.

The lakes of the Tippecanoe-Barbee district have the appearance on the map of being channel lakes; and a field examination at first suggests the same interpretation. But, wherever I have seen the high ground near the lakes exposed, in gravel pits and cuts, it is stratified, thus indicating waterlaid material. This

suggests the following interpretation as to their formation. From the studies of Leverett just referred to, it is certain that the Saginaw lobe retreated first. When this occurred, the exposed northwest face of the Huron-Erie lobe in this region was ragged and overlaid with the material of the interlobate moraine. Ice tongues or masses filled the region now occupied by these lakes and the water from the wasting ice front flowed between the ice tongues and sorted the material. With the retreat of the ice front and the establishment of the drainage to the south thru the Wabash, came the melting of the ice tongues, so that rather long, deep depressions remained, which then became lakes and part of the postglacial drainage lines.

Many of the original lakes of Indiana are now reduced to level swampy areas. A large part of this reduction has been due to natural causes, principally to the accumulation of plant deposits. However, during the last fifty years, the agent most vigorously affecting lakes has been man. Many of the smaller lakes have been destroyed and the levels of some of the larger have been lowered by artificial drainage.

Of the lakes that are mentioned in this paper, the following have been lowered by artificial drainage: Little Eagle (Chapman), Beaver Dam, Yellow Creek, Lingle (Dewart), Ridinger and Eagle (Winona). This is now prohibited by statute (Burns' *Annotated Statutes* 1914, §6162).

On account of the increased value of lake properties in recent years and earlier for the development of power, many of the lakes have had their areas increased by damming. The following lakes of this basin have been so treated: Eagle (Winona), Webster, Tippecanoe (dam out at this date), Manitou, and Palestine.

The total number of lakes in Indiana in 1915 is estimated by Leverett and Taylor (1915) at "less than 400".

#### MORPHOMETRY

The existing maps of a few of these lakes (Blatchley and Ashley, 1900) were found to be correct in outline, and consequently were used for base maps. Usually the outlines of the lakes were determined with a plane table, which, for small lakes such as these are, gives a very accurate result.

Lines along which soundings were to be made were established on the lake and recorded on the map. Calm days were utilized for this work, when it was at all possible. The soundings were

placed by making an equal number of oar strokes between them. This is a very rapid method, and, when a man has been properly trained, is remarkably accurate; certainly sufficiently so in a small lake. The effort was not to row at a standard rate, but to keep the rate constant on each line. This eliminated the effect of head and tail breezes. These soundings were checked by cross series and stadia methods, which indicate that the errors are very slight when they occur at all.

Absolute accuracy of location is not claimed for them, but they exhibit the form of the basins and permit a very close approximation of their volume to be calculated. The soundings have been recorded on the maps and contours drawn to facilitate reading the maps and making calculations based upon them. The contours are merely interpretations of the soundings. A larger number of soundings would probably necessitate slight changes.

The capacity of the lakes and their areas are shown in the accompanying tables. The areas of the maps have been determined by means of a planimeter. The volume has been determined by measuring the area within each contour line by means of a planimeter and then regarding the solid between the planes of adjacent contours as the frustrum of a cone. The usual formula for the calculation of the volume of a frustrum was then applied. Only those lakes whose maps we have made are included in the table.

The areas of these lakes vary from a minimum of 85,084 sq.M. in Sawmill lake to a maximum of 3,265,607 sq.M. in Manitou. In Dan Kuhn lake the deepest point is 7.9 M., while in Yellow Creek a depth of 22 M. is reached. Yellow Creek has also the greatest average depth (10 M.), while in Dan Kuhn the average depth is only 2.588 M. In volume they range from 9,787,024 cu.M. in Manitou to 284,716 cu.M. in Sawmill lake.

Of the lakes in this basin that have been previously mapped, Eagle has a maximum depth of 24.7 M. and Tippecanoe 37.5 M.

#### TEMPERATURE

So far as temperature and all the phenomena depending upon it are concerned, lakes in temperate latitudes are very much more alike in winter than in summer. In the late summer their differences are at a maximum. If only a single series of observations of temperature and related phenomena can be made on a lake, these observations are more instructive if made in late or mid-



TABLE I. SHOWING THE AREA, MAXIMUM DEPTH, AVERAGE DEPTH, AND VOLUME OF THE LAKES WHOSE MAPS APPEAR IN THIS REPORT.

| Lake                     | Area      | Maximum depth | Average depth | Volume cu.M. |
|--------------------------|-----------|---------------|---------------|--------------|
| Manitou.....             | 3,265,607 | 14.8          | 2.997         | 9,787,024    |
| Yellow Creek.....        | 576,785   | 22.           | 10.           | 5,767,850    |
| Hammon (Big Barbee)..... | 1,062,294 | 15.           | 6.7319        | 7,150,260    |
| Plew.....                | 418,635   | 18.6          | 7.327         | 3,047,320    |
| Silver.....              | 378,909   | 10.4          | 4.1172        | 1,560,044    |
| Beaver Dam.....          | 794,979   | 20.           | 4.2958        | 3,415,071    |
| Sawmill.....             | 85,084    | 10.           | 3.3463        | 284,716      |
| Ridinger.....            | 526,848   | 13.3          | 6.44          | 3,392,901    |
| Kuhn.....                | 268,709   | 8.2           | 3.912         | 1,051,193    |
| Dan Kuhn.....            | 543,117   | 7.9           | 2.588         | 1,405,586    |
| Irish.....               | 621,998   | 11.           | 3.326         | 2,068,765    |

summer. The temperatures in the appended tables are all summer records. From what is known of other lakes it is often possible to infer antecedent events from summer temperatures.

It may be well to review, briefly, the series of events that occur in a lake from the melting of the ice to the establishment of summer conditions.

When the ice first melts in the spring, the surface of the water is at 0°C. The water at the bottom of the lake is slightly warmer than that, but less than 4°C. Hence the lower layers are slightly heavier. This slight difference in density is further reduced by the absorption of heat at the surface, so there is very little resistance to mixture. As a result, the first windy day after the ice has disappeared is likely to mix the water of the lake completely, i.e. to cause the spring "turnover".

As the temperature is generally increasing at this season, the surface of the lake is absorbing heat almost constantly. If the weather is windy, this surface water is mixed with that below so that the lake again becomes homothermous.

The thermal resistance to mixture of two adjacent strata of water increases directly as their difference in temperature and as their thermal difference from 4°C. When there occurs a warm period of little wind the heat is absorbed and remains in the upper meter or two of water. The thermal resistance to mixture between this layer and the one immediately beneath it is the



greatest of any two layers in the lake. But the effect of wind is also greatest near the surface. On a windy day this upper homothermous layer is gradually thickened. It is evident that the addition of the lower cooler water to the homothermous warmer water above reduces the difference in the temperature of the two layers, hence their resistance to mixture. However, the effect of the wind decreases as the depth increases.

With the advance of the season and the consequent increase in the rate of heat absorption, the effect of the wind in the lower levels of the lake is overcome, thus cutting them off from the wind-circulated region nearer the surface. The result is that during the summer months there are established three strata in all lakes in this latitude, except the very shallow ones. The first is a warm stratum near the surface, about 5 or 6 meters thick in our lakes; then a layer below this extending to 10 or 12 meters in which the temperature changes very rapidly, and finally a cold layer reaching to the bottom. These layers have been called by Professor Birge the epilimnion, thermocline, and hypolimnion respectively. The thermocline is called "Sprungschicht" by Richter, and German limnologists generally follow his terminology. English writers use the awkward phrase "discontinuity layer".

#### HEAT BUDGETS OF LAKES

The temperature of a lake indicates the amount of heat it contains. To develop the summer condition just described, much heat must be absorbed. However, not all the heat that impinges on the lake is absorbed. Much of it is reflected. Wedderburn (1910) shows from the calculations of Knott that Loch Ness reflects about three times as much heat as it absorbs. The annual "budget of heat", as Birge has called it, is calculated from the difference in the winter and summer temperatures. Concerning the annual budget in Indiana lakes, nothing is known because we have no records of winter temperatures. The heat that is absorbed after the lake passes 4°C., or the point of maximum density, is due in large part to the influence of wind, which carries water from the surface to the deeper levels of the lake, thus storing the heat. This has been called "wind-distributed heat".

This has been calculated for the Indiana lakes appearing in Table III, which follows. It is absolutely true only for the date on which the observations were made. But it has been shown

for the "Finger lakes" of New York and some of the Wisconsin lakes that the "heat budget" does not change materially during the months of July and August, i.e. radiation equals absorption during this period. Since all of our observations were made during these months, they probably form a very accurate picture of the maximum load. It is of course evident that the heat content would vary more in our Indiana lakes because the variable epilimnion forms a larger proportion of their volume than it does in the deeper "Finger lakes".

There have been proposed three methods of calculating and expressing the amount of heat contained in lakes. Forel (1895) calculated the amount of heat in a column of water extending from the bottom to the surface in the deepest part of Lake Geneva. This method makes it possible to compare profitably only lakes of similar depth, thus limiting the value of the method.

Halbfass (1910) calculated the total heat energy in a lake. This makes possible the comparison of the heat budgets in various lakes, but since it takes no account of the area of a lake, it is impossible to infer the rate of cooling, the influence of the lake on climate, liability to freeze, etc.

Birge (1914) has proposed a method by which the heat of a lake is expressed in gram calories per square centimeters of surface. This is determined by multiplying the average temperature of the lake by the average depth in centimeters. For the purpose of comparison, this method of expressing heat is evidently superior to the methods of Halbfass and Forel.

The method used by Professor Birge in calculating the average temperature was to take the average temperature of the water between two adjacent contours and multiply this by the volume contained between them; then add the products and divide by the total volume. Percentages of volume were also used, which of course produced the same result. In determining the average temperature of the water between two contours, Birge takes the arithmetical mean of the temperature at the two contours. This is absolutely correct for lakes with vertical sides, but in lakes with gently sloping sides it gives an average below the true one. Professor Birge was perfectly aware of this discrepancy, which is never great in our lakes.

A closer approximation is obtained by applying the formula for obtaining the average temperature of the frustrum of a cone, whose bases differ in temperature and in which the gradient is a

constant. The formula\* that I have used is as follows:

$$T = \frac{(3A + 2\sqrt{AB} + B)(t' - t'')}{(A + \sqrt{AB} + B)4} + t'', \quad \text{in which } T \text{ is average temperature, } t' \text{ is temperature at upper contour, } t'' \text{ is temperature at lower contour, } A \text{ is area at upper contour, and } B \text{ is area at lower contour.}$$

As I have stated before, the difference in the results in Birge's method and the one here proposed is slight in lakes with steep slopes and greater in lakes in which the slopes are more gentle.

The following comparison between Yellow Creek lake and Manitou lake illustrates the point. Yellow Creek has a much steeper slope than Manitou.

TABLE II. A COMPARISON OF THE RESULTS OF CALCULATING THE AVERAGE TEMPERATURE OF LAKES

|              | Area in Sq.M. | Average Depth | Average Temperature |                 | Wind-distributed Heat |                 |            |
|--------------|---------------|---------------|---------------------|-----------------|-----------------------|-----------------|------------|
|              |               |               | Birge's Method      | Proposed Method | Birge                 | Proposed Method | Difference |
| Manitou.     | 3,265,607     | 2.997         | 21.48               | 21.89           | 5238                  | 5361            | 123        |
| Yellow Creek | 576,785       | 10,000        | 15.4297             | 15.4585         | 11429                 | 11458           | 29         |

Birge's method is much more rapid and on that account is usually to be preferred.

The wind-distributed heat of these lakes is very much less than that of the "Finger lakes" of New York, where in 1910 it varied from 22,800 calories in Keuka to 32,000 calories in Seneca; notwithstanding the fact that more heat per square centimeter strikes the surface of these lakes than is received by the New York lakes. This is due to two factors. First, the spring usually advances more rapidly or rather the changes are likely to be more abrupt in the Indiana lakes than in those of New York, because the climate is more typically continental. This results in an early

\*I am under obligations to Mr. F. G. Tucker for developing this formula for me.

stratification of our lakes. The second factor is the depth of the lakes. The deeper New York lakes have a greater capacity for heat. This factor also delays the stagnation period.

The following table gives the amount of wind-distributed heat in the different types of Indiana lakes so far examined:

TABLE III. SHOWING THE HEAT CONTENT OF TYPES OF INDIANA LAKES

| Lake                        | Average depth | Average temperature | Wind-distributed heat |
|-----------------------------|---------------|---------------------|-----------------------|
| Manitou.....                | 2.997         | 21.89               | 5,361                 |
| Yellow Creek.....           | 10.           | 15.45               | 11,458                |
| Big Barbee.....             | 6.7319        | 19.6911             | 10,563                |
| Plew.....                   | 7.327         | 17.8833             | 10,172                |
| Silver.....                 | 4.1172        | 22.95               | 9,438                 |
| Little Eagle (Chapman)..... | 4.975         | 24.713              | 10,304                |

The effect of the wind on the circulation of water in a lake and the factors governing it are worthy a more detailed analysis than, to the present time, has been given them.

A priori, the shape of the basin, its size, depth, and exposure, the relation of its major axis to the direction of the prevailing winds are factors that enter into the problem. For example, a small circular basin protected by high moraines (e.g. Center lake) will become thermally stratified much sooner than if the lake had low shores and were elongated in the direction of the prevailing winds (e.g. Turkey lake). The nature of the currents, i.e. their directions, depths, and changes, during continued wind in various types of basins is not well known.

Concerning the effect of the wind in the early spring, Birge and Juday (1911, p. 27) say: "The surface water will be blown across the lake and when it reaches the leeward side it must return; some of it will remain at the surface and return around the lake; but probably the greater portion will turn down and return at various depths, some of it returning along the bottom."

In his report on the temperature of the Scottish lakes Wedderburn (1910, p. 125) states: "Numerous observations were made in Loch Ness after the discontinuity had appeared, and although the results obtained were extremely complicated, it appeared that



the return currents took place above the discontinuity, sometimes very near the surface. It also appeared that the return current was nearer the surface at the windward than at the lee end of the lake, which is natural, as it might be expected that they would follow the direction of the isotherms."

A study is being made on Winona lake to determine the details of the effect of the wind on the lake during the summer stagnation period. A preliminary statement of the results of the findings may be stated here. The immediate object was to determine the depth, direction, and velocity of the currents caused by wind in the different parts of the lake. The determination of the velocity was not accurate, because the current meter used was so constructed that the vertical motion of the boat, tossed by waves, influenced the rate of revolution. A meter is now planned that I think will eliminate this error.

The direction of the currents was determined with a vane. This vane was constructed of galvanized iron, 60 cm. long, 30 cm. wide at one end, and 20 cm. wide at the other. This was riveted into a rod 2 M. long and weighted so that it hung vertically. To the upper end of this rod was attached a bicycle hub which served as a handle and supplied ball bearings to the apparatus. One set of readings is given on the accompanying outline of the lake.

At 11 a.m. after there had been a rather high wind for two or three hours, observations were made at Station I. The water in the first meter was moving in the direction of the wind, i.e. to the southeast. In the second meter, and as far down as I could lower the vane, the water was moving in the opposite direction to that of the wind.

At 1:30 p.m. the upper two meters were moving in the direction of the wind. At Yarnell Point the water was moving in the general direction of the wind but parallel to the direction of the shore. At the south shore pier it was moving at approximately right angles to the wind. At Boys' City pier, 100 ft. from shore, the water was moving in a direction opposite that of the wind. At an anchored pier nearly 200 ft. from shore at the surface and as far down as we could determine the water was moving northwest, opposite the wind. A final reading was made at Kosciusko pier. At the base of this pier the water was flowing parallel to the shore and in the general direction of the wind. At the end of the pier, 132 ft. from the shore, the water was moving more nearly at right angles to the wind, i.e. toward the southwest.

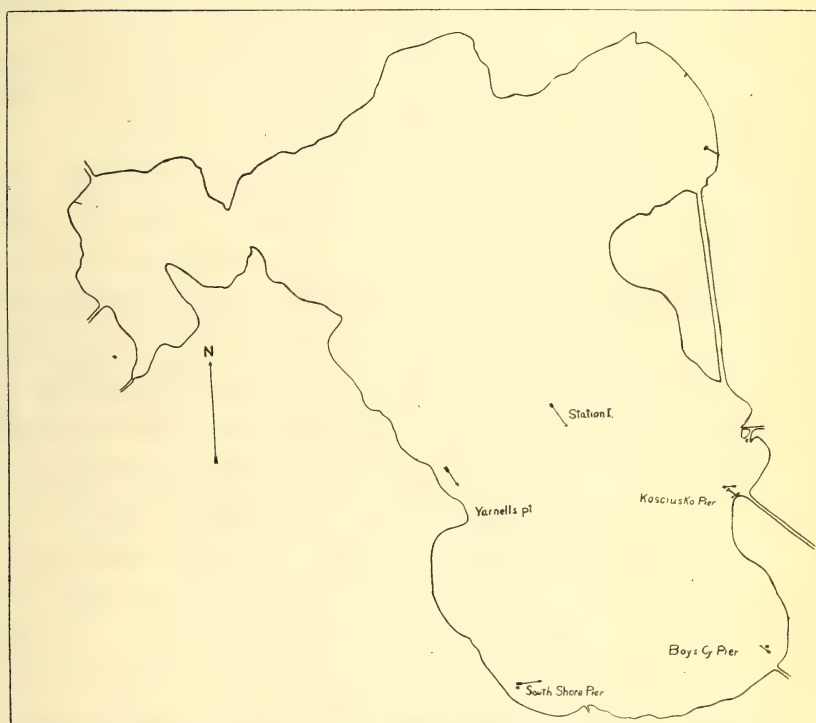
From this set of readings it is certain that no water was returning to the windward side of the lake along either shore. It appears that the water from the entire lake surface was at first moved toward the lee side of the lake. The contour of the shores modified the inshore currents and concentrated the water at the embayment on the lee side at Boys' City. This piling up of the water at this point produced a state of unstable equilibrium so that a return current was set up. As the effect of the wind increased this return current involved all the water from surface to bottom for some distance out in the lake, certainly more than 150 ft. The point where the return current passed beneath the wind-driven water was not determined since our anchor would not hold the boat.

In this lake there are no return currents near the shore such as Juday postulates as possible nor are the conditions similar to those described for Loch Ness by Wedderburn (1910, p. 124) when he says: "It also appeared that the return current was nearer the surface at the windward than at the lee end of the lake, which is natural, as it might be expected that they would follow the direction of the isotherms."

#### OXYGEN

The oxygen was determined by the Winkler (1888; 1889) method. This method was introduced into lake work almost simultaneously by Birge and Juday (1911) and Brönstedt and Wesenburg-Lund (1911), and is certainly the most accurate and best adapted to lake work of any method available. The oxygen was usually determined at 2-meter intervals to 10 meters, and then at 5-meter intervals to the bottom. In the epilimnion, the oxygen in the water approaches the saturation point. It is evenly distributed in windy weather, but during periods of stagnation the curve becomes irregular. If there happens to be a relatively luxuriant growth of algae at some particular level, and the water above is not turbid, these plants by photosynthesis will often make a noticeable increase in the oxygen at this level. This amount often exceeds the saturation point. The levels, temperatures, etc., of the supersaturations we have found are shown in the table below:

As I have stated above, "surface" in these tables means on the average about 1 dm. below the surface. It often happens that there is less oxygen near the surface than in some of the lower levels of the epilimnion. This is not always due to the increase



SKETCH MAP OF EAGLE LAKE SHOWING DIRECTION OF SURFACE CURRENTS.  
CAUSED BY WIND.





TABLE IV. SUPERSATURATIONS

| Lake         | Depth   | Date         | Temperature<br>centi-<br>grade | Oxygen | Satura-<br>tion<br>point | Per<br>cent<br>satura-<br>tion |
|--------------|---------|--------------|--------------------------------|--------|--------------------------|--------------------------------|
| Chapman....  | Surface | Aug. 2, '13  | 27.1                           | 6.72   | 5.594                    | 120.2                          |
|              | 2M.     | Aug. 2, '13  | 26.1                           | 5.82   | 5.672                    | 102.6                          |
| Manitou..... | Surface | Aug. 11, '14 | 28.8                           | 6.34   | 5.492                    | 115.4                          |
|              | 2M.     | Aug. 11, '14 | 26.4                           | 5.92   | 5.648                    | 104.8                          |
| Center.....  | Surface | Aug. 19, '13 | 26.1                           | 6.52   | 5.672                    | 114.7                          |
| Center.....  | Surface | Aug. 17, '12 | 23.3                           | 5.93   | 5.91                     | 100.3                          |
|              | 1M.     | Aug. 17, '12 | 23.3                           | 6.09   | 5.91                     | 103.0                          |
|              | 3M.     | Aug. 17, '12 | 22.5                           | 6.09   | 5.99                     | 101.6                          |
| Pike.....    | Surface | July 19, '13 | 26.1                           | 6.24   | 5.672                    | 110.0                          |
|              | 2M.     | July 19, '13 | 26.1                           | 6.08   | 5.672                    | 107.2                          |
| Turkey.....  | 4M.     | July 31, '13 | 25.                            | 6.33   | 5.76                     | 109.0                          |

by photosynthesis just described, but is caused by the decay of plankton in the upper layers. When plankton dies some of it begins, at once, slowly to sink. Some of it, however, seems to form gas bubbles which for a time float it. Disintegrating *Microcystis* is often found near the surface. This decay of plankton uses up oxygen, and in very calm weather it may be consumed more rapidly than it is absorbed. The result is that the amount present is often considerably below the saturation point.

In the thermocline the oxygen always decreases rather rapidly. This is due to the fact that the water in the upper part of the thermocline has access to the wind-distributed oxygen of the epilimnion, while the lower levels of the thermocline do not.

In the deeper lakes, especially Tippecanoe and occasionally in Eagle, there is a marked decrease in the amount of oxygen in the upper part of the thermocline and an increase in the lower part of the thermocline followed by the gradual decrease characteristic of the hypolimnion. Juday has suggested that this phenomenon may be explained as follows: The plankton that dies in the epilimnion sinks rapidly in the warm water of the upper levels. But when it reaches the cooler and consequently more viscous water of the thermocline, its rate of sinking is decreased, thus making the planktons more numerous, so numerous that, despite the decrease in temperature, their decay diminishes the oxygen more rapidly than in the epilimnion.

Mr. G. N. Hoffer made ten bacterial counts in these lakes. In all but two, the counts showed that the bacteria are more numerous at the surface, at the bottom, and at a point usually in the thermocline, than at other levels. While the data are not elaborate enough to warrant wide generalizations, they appear to substantiate the postulate of Juday concerning the decrease of oxygen in the thermocline; and the suggestion that I have just made, namely, that considerable plankton disintegrates at or near the surface. The bacteria counts are appended.

The rate of reduction of the amount of oxygen in the hypolimnion depends upon the amount of organic matter present and the various factors that influence the date of thermal stratification. As I have indicated, the latter are of two sorts, a group that is constant for any given lake and a group that is variable. The former group includes dimensions and shape of basin, relation of long axis to direction of prevailing winds, the surrounding topography, etc. The latter includes the weather conditions previous to the stratification. If the weather is warm during this period, with winds of low velocity, stratification occurs before the temperature of the lake is raised very much so that the water in the hypolimnion remains cold.

If, however, the weather is cool and windy, the water of the lake continues to circulate and the temperature of the whole lake rises. When stratification is finally established, the temperature of the hypolimnion is much higher than if the weather had turned suddenly warm.

The whole interrelation of factors that influence the reduction of oxygen in the hypolimnion in lakes is so complex that it cannot always be inferred from a summer series.

In Center lake, for instance, the temperature at the bottom in 1912 was 49° while in 1913 it was 55°. The water certainly circulated for a longer period in 1913 than in 1912. In 1912 there was more oxygen at 7 meters than at 6 meters in 1913. In both years there was no oxygen in the lower levels.

In Turkey lake the bottom (18 M.) had a temperature of 60° and oxygen was still present, while Little Eagle (Chapman) had no oxygen at the bottom (11 M.) with practically the same temperature. This difference is probably due to the greater growth of plants in Chapman which furnished an abundant supply of oxidizable material.

In Webster lake there are several rather deep basins connected

by shallow water. Observations were taken in two of these on the same afternoon. These two basins have approximately the same depth. The large one, in the open exposed part of the lake, had oxygen in small quantity on the bottom and a temperature of  $54^{\circ}$ , while the smaller protected kettle hole near the west side had a temperature of  $45.5^{\circ}$  and no oxygen at the bottom. It is perfectly evident from these data that the latter region of the lake was stratified much sooner than the former.

These lakes that have an oxygenless region during summer have also extensive growths of attached aquatic plants in the littoral region. In the latter part of August these become covered with blue-green algae (chiefly *Oscillatoria*). Many of them die, break from the substratum, and become united into mats at the surface. These are blown about by the wind. I have seen mats a square meter in area near the center of Eagle lake. Some of this material is washed ashore, but with the cooling of the water and consequent death of the blue-green algae, much of this material sinks.

This is the source of a large part of organic substance that depletes the oxygen at the bottom of the lake. Juday (1911) finds in many Wisconsin lakes that the organic material at the bottom of lakes is derived from the leaves of trees. I have so far found no Indiana lakes in which this factor seemed to be potent.

### CARBON DIOXIDE

The relation of the carbon dioxide and carbonates to photosynthesis and consequently the productivity of waters is well known. One of the clearest statements of these relations is made by Juday (1911). Briefly these relations are the following: Carbon dioxide exists in a lake in three forms, first as free carbon dioxide,  $\text{CO}_2$  in solution; second, as the acid radical of normal carbonates, chiefly of calcium ( $\text{CaCO}_3$ ) or magnesium ( $\text{Mg. CO}_3$ ); third, as the second member of the bicarbonates formula of the same metals. In the first and third of these forms it is available for photosynthesis. Only a relatively small amount of free  $\text{CO}_2$  can be dissolved in water under ordinary conditions. However, when the first two of these, namely, free  $\text{CO}_2$ , and normal carbonates, are present in solution, the third is formed. Thus the presence of normal carbonates makes it possible for lakes, during the periods of complete circulation, to store available  $\text{CO}_2$  by the formation of bicarbonates.



In so far as the productivity of a lake depends on the materials for photosynthesis, the more carbonates present in the lake water, the more productive will be the lake. This principle has been established by studies on the lakes of Wisconsin. The soft water lakes produce relatively little plankton while the hard water lakes are very productive.

The lakes of this basin, so far as they have been examined, are all hard water lakes. In this respect they very closely resemble the lakes of southern Wisconsin.

Lakes that have a complete vernal circulation begin the summer with an equal vertical distribution of carbon dioxide and carbonates. However, after the stratification, the carbon dioxide is reduced in the epilimnion by photosynthesis and increased in the hypolimnion by the oxidation of carbon compounds. The reduction of the soluble bicarbonates of the epilimnion to the less soluble normal carbonates by photosynthesis results in their precipitation from the epilimnion. In the hypolimnion they pick up free carbon dioxide and again pass into solution as bicarbonates. As a result of this process, the curve for the vertical distribution of free  $\text{CO}_2$  and carbonates is sigmoid. Most of our gas collections were taken in the afternoon and photosynthesis had usually been going on actively for several hours just previous. This may in part account for the fact that the upper levels in many of the lakes were alkaline. The lower levels were all acid and usually held in solution rather large amounts of carbonates. The maxima for different lakes ranged from 32 cc. per liter in Winona to 60 cc. per liter in Center lake. These maxima, of course, vary with the season and the year. For details, see the appended tables.

In two of these lakes the distribution of the free  $\text{CO}_2$  is different from all of the others and different from any of the Wisconsin lakes. The tables for Yellow Creek lake and Plew lake show that free carbon dioxide decreases from the surface to 6 M. where the water is neutral. From this point to the bottom it gradually increases. This decrease in carbon dioxide is not associated with an increase in oxygen as would be the case if it were due to photosynthesis. In Yellow Creek lake the deepest point of the lake is east and a little south of a ridge of marl that projects from the northwest shore of the lake. Most of the water on this ridge is less than a meter in depth. A high wind would stir up the marl on this ridge and carry it over the lake. This marl is largely calcium carbonate and consequently would pick up free carbon



dioxide as it sinks. In the cooler denser water of the thermocline the rate of sinking would be decreased. This may account for the total disappearance of carbon dioxide at that level. It must be remembered also that the decreased temperature would also reduce the rate of the chemical reaction.

At the west end of Plew lake there are considerable marl deposits so that the conditions in it may have a similar explanation.

### PLANKTON

Quantitative plankton collections have been made in connection with each series of gas samples. As I have already mentioned, Mr. G. N. Hoffer made series of bacterial determinations in several of the lakes (see table p. 26). Some correlations between the dissolved oxygen and carbonates, and the plankton are apparent, but these relations are not constant or general. For instance, in Pike lake the decrease in oxygen between 2 M. and 4 M. is accompanied by a reduction in *Microcystis* and *Ceratium* but *Melosira* reaches its maximum at 4 M. and is three times as numerous at 8 M., where there is no oxygen, as at the surface. In Hammon (Big Barbee) lake no marked change accompanies the sudden decrease in oxygen between 4 M. and 6 M.

The bacterial counts indicate that there are always more bacteria at the surface than at 2 meters. There is generally an increase in or near the thermocline and often one at the bottom altho there may be a marked decrease in the number of bacteria at the bottom as in Chapman lake.

It has been demonstrated that all of these lakes are hard water lakes and have at all levels a surplus of carbon dioxide available for photosynthesis. Notwithstanding this fact, it is certain that some of our lakes produce much more plankton than others. Yellow Creek lake is the poorest in plankton of any so far examined.

This variation in the amount of phytoplankton in lakes of approximately equal hardness and the lack of close correlation between the physical and biological elements of the lake complex which we have considered indicate that there are other potent factors influencing the life of a lake. The relation of the littoral to the pelagic region of a lake should certainly be given more detailed analysis than it has received in the past. For instance, Yellow Creek lake has associated with its paucity of plankton a very narrow littoral region (13 per cent of its area above 2 M.).

Not only is this littoral region limited but it has very few aquatic phanerogams growing on it. This latter condition may be the cause of the former. The decay of large masses of these aquatic phanerogams may be the source of nitrogenous or other soluble compounds necessary to the development of a rich plankton fauna and flora. It is of course possible that some common factor may influence both the littoral and pelagic regions.

The study of the food of *Daphnia* by Mr. Fisher and myself makes it clear that these lakes possess large amounts of nanoplankton too small to be captured in a No. 20 silk net. The relation of their metabolism and decay to that of the grosser forms is unknown.

The pioneer and important work of Birge and Juday on the oxygenless region of certain types of lakes and their fauna has opened up a new and interesting field in lake economy. The problems connected with this are essentially physiological. The work on the oxygenless region of the lakes of Indiana, especially Center lake, confirms the fact announced by Birge and Juday that a rather large fauna exists under anaerobic conditions in the hypolimnion of many lakes. A more careful analysis of the conditions in this region and extended experimental work certainly will yield valuable results.

In this paper no data are given for Eagle (Winona) lake. A more detailed study of this lake is in progress and will be published separately.

# APPENDIX A: BIBLIOGRAPHY OF WORKS CITED

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# APPENDIX B: TABLES OF TEMPERATURE AND DISSOLVED GASES

In the following tables the first column exhibits the depth in meters; the second the temperature Centigrade; the third the cubic centimeters of oxygen per liter; the fourth the number of cubic centimeters free carbon dioxide per litre; the fifth the number of cubic centimeters of carbon dioxide per liter present as normal carbonates; the sixth the number of cubic centimeters of carbon dioxide per liter present as bicarbonates. When this column is blank, the water is acid; that is, the half-bound carbon dioxide equals the fixed.

LAKE MANITOU (August 11, 1914)

| Depth in meters  | Temperature<br>Centigrade | Oxygen<br>cc. per<br>liter | Free<br>carbon<br>dioxide | Carbon<br>dioxide<br>as normal<br>carbonates | Carbon<br>dioxide<br>as<br>bicarbonates |
|------------------|---------------------------|----------------------------|---------------------------|--|---|
| Surface.....     | 28.8                      | 6.34                       | -5.06                     | 38.42  | 33.36                                   |
| 2 meters.....    | 26.4                      | 5.92                       | -6.17                     | 38.93  | 32.76                                   |
| 4 meters.....    | 21.6                      | 5.56                       | 2.52                      | 44.98  | .....                                   |
| 6 meters.....    | 15.                       | 3.                         | 6.06                      | 44.48  | .....                                   |
| 8 meters.....    | 11.3                      | 2.61                       | 6.82                      | 42.72  | .....                                   |
| 10 meters.....   | 10.8                      | 2.41                       | 5.33                      | 40.95  | .....                                   |
| 13.7 meters..... | 10.2                      | 2.32                       | 9.60                      | 43.73  | .....                                   |

CHAPMAN LAKE (August 2, 1913)

|                |      |      |       |       |       |
|----------------|------|------|-------|-------|-------|
| Surface.....   | 27.1 | 6.72 | ..... | 30.3  | ..... |
| 2 meters.....  | 26.1 | 5.82 | ..... | 29.8  | ..... |
| 4 meters.....  | 23.8 | 5.72 | ..... | 31.09 | ..... |
| 6 meters.....  | 22.4 | 4.84 | 2.3   | 32.4  | ..... |
| 8 meters.....  | 18.3 | 1.57 | 8.56  | 36.6  | ..... |
| 10 meters..... | 15.  | .0   | 10.9  | 45.8  | ..... |

CENTER LAKE (August 8, 1913)

|                |      |       |       |       |       |
|----------------|------|-------|-------|-------|-------|
| Surface.....   | 26.1 | 6.52  | 1.51  | 35.64 | ..... |
| 2 meters.....  | 26.1 | 5.82  | 5.30  | 35.13 | ..... |
| 4 meters.....  | 22.5 | 5.08  | 5.05  | 36.90 | ..... |
| 6 meters.....  | 15.5 | .412  | 17.94 | 38.42 | ..... |
| 8 meters.....  | 13.  | .041  | 15.16 | 37.66 | ..... |
| 10 meters..... | 12.7 | .0    | 15.92 | 40.19 | ..... |
| 12 meters..... | 12.7 | ..... | 15.67 | 44.24 | ..... |



CENTER LAKE (August 17, 1912)

| Depth in meters | Temperature<br>Centigrade | Oxygen<br>cc. per<br>liter | Free<br>carbon<br>dioxide | Carbon<br>dioxide<br>as normal<br>carbonates | Carbon<br>dioxide<br>as<br>bicarbonates |
|-----------------|---------------------------|----------------------------|---------------------------|--|---|
| Surface.....    | 23.3                      | 5.93                       | -2.53                     | 31.85  | 29.32                                   |
| 1 meter.....    | 23.3                      | 6.09                       | -5.06                     | 31.85  | 26.79                                   |
| 3 meters.....   | 22.5                      | 6.09                       | -1.12                     | 29.83  | 28.71                                   |
| 5 meters.....   | 20.2                      | 5.11                       | 1.26                      | 31.35  | .....                                   |
| 7 meters.....   | 13.                       | .94                        | 5.81                      | 39.44  | .....                                   |
| 9 meters.....   | 11.1                      | .0                         | Broken                    | .....  | .....                                   |
| 11 meters.....  | 9.4                       | .0                         | 14.91                     | 50.31  | .....                                   |

PLEW OR SECHRIST LAKE (August 1, 1914)

3 p.m. Clear, hot wind began just before the observations were taken.

|                |      |       |       |       |       |
|----------------|------|-------|-------|-------|-------|
| Surface.....   | 27.1 | 5.23  | 2.52  | 30.84 | ..... |
| 2 meters.....  | 25.5 | ..... | ..... | ..... | ..... |
| 4 meters.....  | 24.1 | 4.56  | 1.01  | 35.39 | 33.36 |
| 6 meters.....  | 13.8 | 3.94  | ..... | 33.87 | ..... |
| 8 meters.....  | 9.3  | ..... | ..... | ..... | ..... |
| 10 meters..... | 8.   | 1.55  | 5.05  | 41.96 | ..... |
| 15 meters..... | 6.9  | ..... | ..... | ..... | ..... |
| 17 meters..... | 6.9  | 1.44  | 6.32  | 43.98 | ..... |

BIG BARBEE LAKE (August 25, 1914)

|                  |      |      |       |       |       |
|------------------|------|------|-------|-------|-------|
| Surface.....     | 26.3 | 4.35 | 10.70 | 36.99 | 26.79 |
| 2 meters.....    | 25.5 | 5.09 | 1.26  | 38.42 | ..... |
| 4 meters.....    | 21.6 | 5.09 | 1.76  | 40.44 | ..... |
| 6 meters.....    | 15.  | .24  | 4.55  | 46.51 | ..... |
| 8 meters.....    | 12.2 | .08  | 8.04  | 41.96 | ..... |
| 10 meters.....   | 11.3 | .10  | 8.08  | 43.73 | ..... |
| 10.7 meters..... | 10.2 | .0   | 8.59  | 48.03 | ..... |

## EAGLE (WINONA) LAKE (August 8, 1912)

| Depth in meters | Temperature<br>Centigrade | Oxygen<br>cc. per<br>liter | Free<br>carbon<br>dioxide | Carbon<br>dioxide<br>as normal<br>carbonates | Carbon<br>dioxide<br>as<br>bicarbonates |
|-----------------|---------------------------|----------------------------|---------------------------|--|---|
| Surface.....    | 21.9                      | 4.59                       | -2.03                     | 32.36  | 30.33                                   |
| 2 meters.....   | 21.9                      | 6.                         | -9.04                     | 33.11  | 24.07                                   |
| 4 meters.....   | 21.1                      | 5.95                       | -7.58                     | 32.86  | 25.28                                   |
| 6 meters.....   | 20.5                      | 4.62                       | .252                      | 32.99  | 32.99                                   |
| 8 meters.....   | 14.4                      | 1.67                       | .....                     | .....  | .....                                   |
| 10 meters.....  | 11.6                      | 2.24                       | 2.2                       | 32.36  | 32.36                                   |
| 15 meters.....  | 9.1                       | 2.42                       | .....                     | .....  | .....                                   |
| 20 meters.....  | 8.5                       | 1.15                       | .....                     | .....  | .....                                   |
| 23 meters.....  | 8.3                       | 1.87                       | 8.09                      | 35.39  | 35.39                                   |

## YELLOW CREEK LAKE (August 22, 1914)

|                |      |       |       |       |       |
|----------------|------|-------|-------|-------|-------|
| Surface.....   | 25.5 | 5.57  | 7.07  | 27.04 | ..... |
| 2 meters.....  | 24.4 | 5.59  | 5.05  | 27.30 | ..... |
| 4 meters.....  | 23.3 | 3.09  | 2.32  | 29.32 | ..... |
| 6 meters.....  | 12.7 | 3.12  | 0.    | 29.57 | ..... |
| 8 meters.....  | 8.8  | ..... | ..... | ..... | ..... |
| 10 meters..... | 7.7  | 1.82  | 7.34  | 36.90 | ..... |
| 15 meters..... | 7.2  | ..... | ..... | ..... | ..... |
| 20 meters..... | 7.2  | 1.65  | 12.08 | 37.92 | ..... |

## SILVER LAKE (July 18, 1914)

|                |      |       |      |       |       |
|----------------|------|-------|------|-------|-------|
| Surface.....   | 25.5 | ..... | .75  | 32.6  | 31.85 |
| 2 meters.....  | 25.5 | ..... | 3.03 | 32.10 | 29.07 |
| 4 meters.....  | 21.9 | ..... | 4.02 | 35.39 | 31.37 |
| 6 meters.....  | 16.1 | ..... | 3.79 | 41.20 | ..... |
| 8 meters.....  | 13.  | ..... | 1.23 | 46.00 | ..... |
| 10 meters..... | 13.  | ..... | 6.23 | 48.63 | ..... |

## PIKE LAKE (August 17, 1912)

|                |      |      |       |       |       |
|----------------|------|------|-------|-------|-------|
| Surface.....   | 26.1 | 6.24 | 5.56  | 33.36 | ..... |
| 2 meters.....  | 26.1 | 6.08 | ..... | 33.11 | ..... |
| 4 meters.....  | 23.3 | 2.49 | 9.01  | 36.65 | ..... |
| 6 meters.....  | 16.1 | .17  | 8.84  | 35.13 | ..... |
| 8 meters.....  | 10.  | .0   | 12.89 | 40.95 | ..... |
| 10 meters..... | 8.8  | .0   | 16.93 | 46.76 | ..... |

WEBSTER LAKE STATION I (August 3, 1912)

| Depth in meters | Temperature<br>Centigrade | Oxygen<br>cc. per<br>liter | Free<br>carbon<br>dioxide | Ca bon<br>dioxide<br>as normal<br>carbonates | Carbon<br>dioxide<br>as<br>bicarbonates |
|-----------------|---------------------------|----------------------------|---------------------------|--|---|
| Surface.....    | 21.9                      | 4.182                      | .5                        | 31.60  | .....                                   |
| 2 meters.....   | 21.9                      | 4.100                      | .3                        | 30.72  | .....                                   |
| 4 meters.....   | 21.6                      | 4.068                      | 1.                        | 30.58  | .....                                   |
| 6 meters.....   | 20.5                      | 3.813                      | 3.1                       | 31.85  | .....                                   |
| 8 meters.....   | 16.                       | .186                       | 3.0                       | 37.60  | .....                                   |
| 10 meters.....  | 12.2                      | .045                       | 4.2                       | 40.19  | .....                                   |

WEBSTER LAKE STATION II (August 3, 1912)

|                |      |       |        |       |       |
|----------------|------|-------|--------|-------|-------|
| Surface.....   | 21.9 | 5.478 | 1.517  | 28.82 | ..... |
| 2 meters.....  | 21.9 | 5.28  | 1.517  | 29.07 | ..... |
| 4 meters.....  | 20.  | 4.79  | 1.769  | 30.59 | ..... |
| 6 meters.....  | 13.  | .478  | 6.95   | 38.05 | ..... |
| 8 meters.....  | 9.7  | .301  | 8.469  | 38.17 | ..... |
| 10 meters..... | 8.3  | .105  | 5.309  | 42.98 | ..... |
| 12 meters..... | 7.5  | .0    | 13.146 | 49.55 | ..... |

TIPPECANOE LAKE (August 12, 1912)

|                |      |      |      |       |       |
|----------------|------|------|------|-------|-------|
| Surface.....   | 24.1 | 5.44 | .75  | 32.86 | ..... |
| 2 meters.....  | 23.  | 5.46 | .50  | 31.60 | ..... |
| 4 meters.....  | 21.6 | 5.83 | .50  | 32.86 | ..... |
| 6 meters.....  | 21.1 | 4.81 | 1.01 | 33.36 | ..... |
| 8 meters.....  | 13.1 | 1.06 | 3.16 | 37.67 | ..... |
| 10 meters..... | 11.9 | .19  | 5.30 | 37.41 | ..... |
| 15 meters..... | 8.5  | 2.52 | 5.30 | 34.63 | ..... |
| 20 meters..... | 6.4  | 2.56 | 4.04 | 34.63 | ..... |
| 25 meters..... | 5.8  | 1.54 | 5.81 | 36.65 | ..... |
| 30 meters..... | 5.3  | .26  | 6.82 | 36.15 | ..... |
| 32 meters..... | 5.3  | .41  | 6.57 | 34.13 | ..... |

## TURKEY LAKE (July 31, 1913)

| Depth in meters | Temperature<br>Centigrade | Oxygen<br>cc. per<br>liter | Free<br>carbon<br>dioxide | Carbon<br>dioxide<br>as normal<br>carbonates | Carbon<br>dioxide<br>as<br>bicarbonates |
|-----------------|---------------------------|----------------------------|---------------------------|--|---|
| Surface.....    | 27.7                      | 5.24                       | 3.03                      | 27.80  | .....                                   |
| 2 meters.....   | 27.1                      | 5.53                       | 1.26                      | 27.30  | .....                                   |
| 4 meters.....   | 25.                       | 6.33                       | 2.02                      | 27.30  | .....                                   |
| 6 meters.....   | 23.3                      | 5.65                       | ....                      | 27.56  | .....                                   |
| 8 meters.....   | 21.6                      | 5.79                       | 7.07                      | 27.80  | .....                                   |
| 10 meters.....  | 19.4                      | 3.92                       | 4.04                      | 32.35  | .....                                   |
| 15 meters.....  | 15.8                      | 1.43                       | 5.56                      | 35.13  | .....                                   |
| 18 meters.....  | 15.5                      | .014                       | 6.06                      | 34.88  | .....                                   |

## LINGLE LAKE (July 26, 1913)

|                |      |       |       |       |       |
|----------------|------|-------|-------|-------|-------|
| Surface.....   | 23.6 | 4.60  | 4.29  | 30.33 | ..... |
| 2 meters.....  | 23.6 | 5.38  | 3.03  | 32.61 | ..... |
| 4 meters.....  | 23.  | 5.50  | 7.07  | 29.57 | ..... |
| 6 meters.....  | 22.2 | .43   | 4.8   | 29.32 | ..... |
| 8 meters.....  | 15.  | .109  | 5.56  | 35.89 | Acid  |
| 10 meters..... | 12.2 | .103  | 13.65 | 35.39 | ..... |
| 15 meters..... | 8.8  | 0.    | 11.62 | 36.65 | ..... |
| 20 meters..... | 8.5  | 0.    | 9.35  | 36.90 | ..... |
| 23 meters..... | 8.5  | ..... | 11.88 | 37.66 | ..... |

## BACTERIA IN THOUSANDS PER LITER

Depths in meters form the first column. \* = bottom of the lake between that level and the one above.

|              | Turkey       | Lingle       | Little Eagle | Eagle        | Eagle       |
|--------------|--------------|--------------|--------------|--------------|-------------|
|              | July 31, '13 | July 27, '13 | Aug. 2, '13  | July 22, '13 | Aug. 6, '13 |
| Sur-<br>face | 696          | 90           | 800          | 5,500        | 600         |
| 2...         | 436          | 80           | 400          | 100          | 400         |
| 4...         | 968          | 32           | 200          | 1,500        | 350         |
| 6...         | 266          | 60           | 80           | 1,900        | 400         |
| 8...         | 154          | 192          | 160          | 115          | 150         |
| 10...        | 220          | 234          | 34           | 21           | 120         |
| 15...        | 120          | 122          | ...          | 20           | 120         |
| 20...        | *160         | 72           | ...          | *300         | 140         |
| 25...        | ....         | *106         | ...          | ....         | ....        |



# APPENDIX C: DISTRIBUTION OF PLANKTON

The following tables exhibit the distribution of the most significant plankton. The crustacea are excluded inasmuch as their distribution seems to present a special problem. The depth in meters is expressed in the first line. In part of the lakes, disintegrating *Microcystis* has been marked d. (dead). The colonies that were evidently alive were marked l.

## TURKEY LAKE

|                            | Sur-<br>face | 2<br>Meters | 6<br>Meters | 10<br>Meters | 15<br>Meters | 18<br>Meters |
|----------------------------|--------------|-------------|-------------|--------------|--------------|--------------|
| <i>Microcystis</i> (l).... | 630          | 220         | 1,087       | 577          | 206          | 192          |
| <i>Microcystis</i> (d)...  | 2,326        | 3,881       | 11,111      | 5,567        | 220          | 110          |
| <i>Ceratium</i> .....      | 103          | 178         | 192         | .....        | ....         | 27           |
| <i>Aneura</i> .....        | 40           | 96          | 56          | .....        | 13           | ....         |
| <i>Hexarthra</i> .....     | 17           | 13          | .....       | .....        | ....         | ....         |
| <i>Diffugia</i> .....      | 34           | 123         | 41          | .....        | ....         | ....         |
| <i>Melosira</i> .....      | 11           | 11          | 123         | 115          | 68           | 55           |
| <i>Fragillaria</i> .....   | 11           | 41          | 275         | 115          | 27           | ....         |
| <i>Oscillatoria</i> .....  | 11           | 13          | 41          | 34           | 13           | ....         |
| <i>Euglena</i> .....       | 5            | .....       | .....       | .....        | ....         | ....         |
| <i>Senedesmus</i> .....    | 5            | 13          | .....       | .....        | ....         | ....         |
| <i>Anabaena</i> .....      | .....        | .....       | 13          | .....        | ....         | ....         |

## BIG BARBEE LAKE (July 27, 1914)

|                           | Sur-<br>face | 2<br>Meters | 4<br>Meters | 6<br>Meters | 8<br>Meters | 10<br>Meters |
|---------------------------|--------------|-------------|-------------|-------------|-------------|--------------|
| <i>Microcystis</i> .....  | 110          | 41          | 523         | 206         | 206         | 82           |
| <i>Ceratium</i> .....     | 82           | 96          | 1,293       | 1,142       | 218         | 55           |
| <i>Melosira</i> .....     | 127          | 151         | 493         | 289         | 96          | 68           |
| <i>Aneura</i> .....       | 55           | 68          | 96          | 56          | ....        | 27           |
| <i>Diffugia</i> .....     | 27           | 13          | 55          | 68          | 13          | ..           |
| <i>Fragillaria</i> .....  | 27           | 13          | .....       | .....       | ....        | ..           |
| <i>Anabaena</i> .....     | 13           | ....        | 13          | .....       | ....        | ..           |
| <i>Oscillatoria</i> ..... | 41           | ....        | 178         | 82          | 96          | 56           |

## PIKE LAKE

|                    | Sur-<br>face | 2<br>Meters | 4<br>Meters | 6<br>Meters | 8<br>Meters | 10<br>Meters |
|--------------------|--------------|-------------|-------------|-------------|-------------|--------------|
| Microcystis (l)... | 1,472        | 2,408       | 798         | 206         | 243         | 357          |
| Microcystis (d)... | 275          | 385         | 233         | 426         | 1,789       | 1,500        |
| Oscillatoria.....  | 261          | 233         | 110         | 87          | 55          | 67           |
| Melosira.....      | 619          | 715         | 6,099       | 2,174       | 1,071       | 165          |
| Ceratium.....      | 577          | 581         | 371         | 13          | .....       | .....        |
| Aneura.....        | 68           | 55          | .....       | .....       | 13          | .....        |
| Triarthra.....     | 55           | 13          | 13          | .....       | .....       | .....        |
| Pediastrum.....    | 165          | 151         | 495         | 229         | 137         | 137          |
| Nauplii.....       | 27           | .....       | .....       | .....       | .....       | .....        |
| Diffugia.....      | 27           | 41          | 13          | 13          | 17          | 13           |

## EAGLE LAKE (July 22, 1913)

|                  | Sur-<br>face | 2<br>Me-<br>ters | 4<br>Me-<br>ters | 6<br>Me-<br>ters | 8<br>Me-<br>ters | 10<br>Me-<br>ters | 15<br>Me-<br>ters | 20<br>Me-<br>ters | 23<br>Me-<br>ters |
|------------------|--------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Microcystis, l.  | 16,189       | 4,357            | 1,066            | 1,183            | 321              | 412               | 91                | 22                | 114               |
| Microcystis, d   | 514          | 258              | 240              | 2,064            | 16,601           | 14,239            | 18,206            | 46,054            | 5,182             |
| Ceratium.....    | 274          | 361              | 564              | 564              | 91               | 206               | 22                | 22                | .....             |
| Senedesmis.....  | .....        | .....            | .....            | .....            | .....            | .....             | .....             | 45                | .....             |
| Oscillatoria.... | 651          | 292              | 236              | 178              | 275              | 321               | 91                | 137               | .....             |
| Aneura.....      | 857          | 154              | 153              | 151              | 45               | 45                | .....             | .....             | 22                |
| Melosira.....    | 137          | 233              | 256              | 261              | 527              | 871               | 206               | .....             | 229               |
| Tridencella....  | 102          | 154              | 20               | 13               | .....            | .....             | .....             | .....             | .....             |
| Asterionella...  | 68           | 170              | .....            | .....            | .....            | .....             | .....             | .....             | .....             |
| Hexarthra.....   | 60           | 69               | 61               | 27               | 68               | 45                | 22                | .....             | .....             |
| Heterophrys...   | .....        | 39               | 82               | 68               | .....            | .....             | 32                | .....             | .....             |
| Fragillaria....  | 2,023        | 428              | 1,343            | 3,936            | 1,994            | 1,215             | 298               | 298               | 252               |
| Anabaena.....    | 3,567        | 17               | .....            | 4,665            | 1,444            | 389               | .....             | .....             | .....             |

YELLOW CREEK LAKE (August 22, 1914)

|                   | Surface | 2 Meters | 4 Meters | 10 Meters |
|-------------------|---------|----------|----------|-----------|
| Microcystis ..... | 96      | 41       | 27       | 27        |
| Oscillatoria..... | 234     | 41       | 13       | 66        |
| Hexarthra.....    | 55      | .....    | .....    | .....     |
| Melosira.....     | 412     | 96       | 13       | .....     |
| Ceratium.....     | 66      | .....    | .....    | .....     |
| Lyngbya.....      | 37,849  | 1,610    | .....    | .....     |
| Aneura.....       | 13      | .....    | .....    | .....     |
| Fragillaria.....  | 27      | .....    | .....    | .....     |
| Anabaena.....     | .....   | 205      | 908      | 229       |

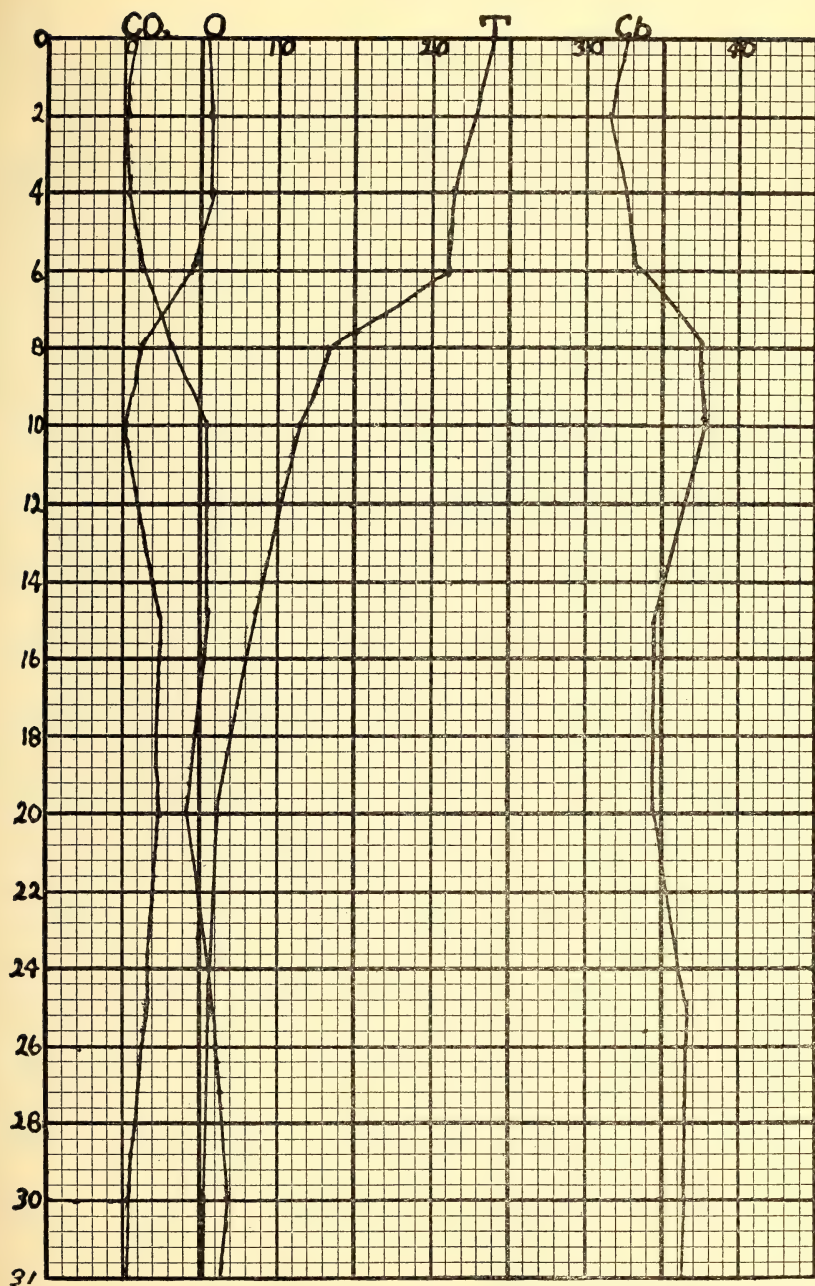
LINGLE LAKE (July 26, 1913)

|                      | Sur-<br>face | 2<br>Me-<br>ters | 4<br>Me-<br>ters | 6<br>Me-<br>ters | 8<br>Me-<br>ters | 10<br>Me-<br>ters | 15<br>Me-<br>ters | 20<br>Me-<br>ters | 25<br>Me-<br>ters |
|----------------------|--------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Microcystis (l)..... | 1,039        | 1,066            | 605              | 1,187            | 344              | 516               | 314               | 261               | 605               |
| Microcystis (d)..... | 4,266        | 4,014            | 619              | 688              | 7,879            | 722               | 2,697             | 6,193             | 5,472             |
| Oscillatoria.....    | 2,970        | 2,844            | 3,647            | 2,167            | 705              | 470               | 440               | 564               | 1,527             |
| Ceratium.....        | 1,731        | 1,399            | 371              | 154              | 51               | 11                | 27                | 27                | 11                |
| Aneura.....          | 470          | 206              | 289              | 206              | 58               | 57                | 13                | 27                | 68                |
| Anabaena.....        | 1,237        | 1,192            | 151              | 1,290            | 68               | .....             | .....             | .....             | .....             |
| Diffugia.....        | 309          | 309              | 41               | 17               | 17               | .....             | .....             | .....             | .....             |
| Melosira.....        | 906          | 321              | 412              | 961              | 378              | 103               | 41                | 13                | 41                |
| Notholca.....        | 45           | .....            | .....            | 17               | .....            | 51                | .....             | 55                | .....             |
| Fragillaria.....     | 91           | 68               | 27               | 34               | 17               | 11                | 13                | 27                | 27                |
| Heterophrys.....     | 45           | .....            | .....            | 137              | 120              | 34                | .....             | .....             | .....             |
| Hexarthra.....       | 34           | 11               | 27               | .....            | .....            | .....             | .....             | .....             | .....             |

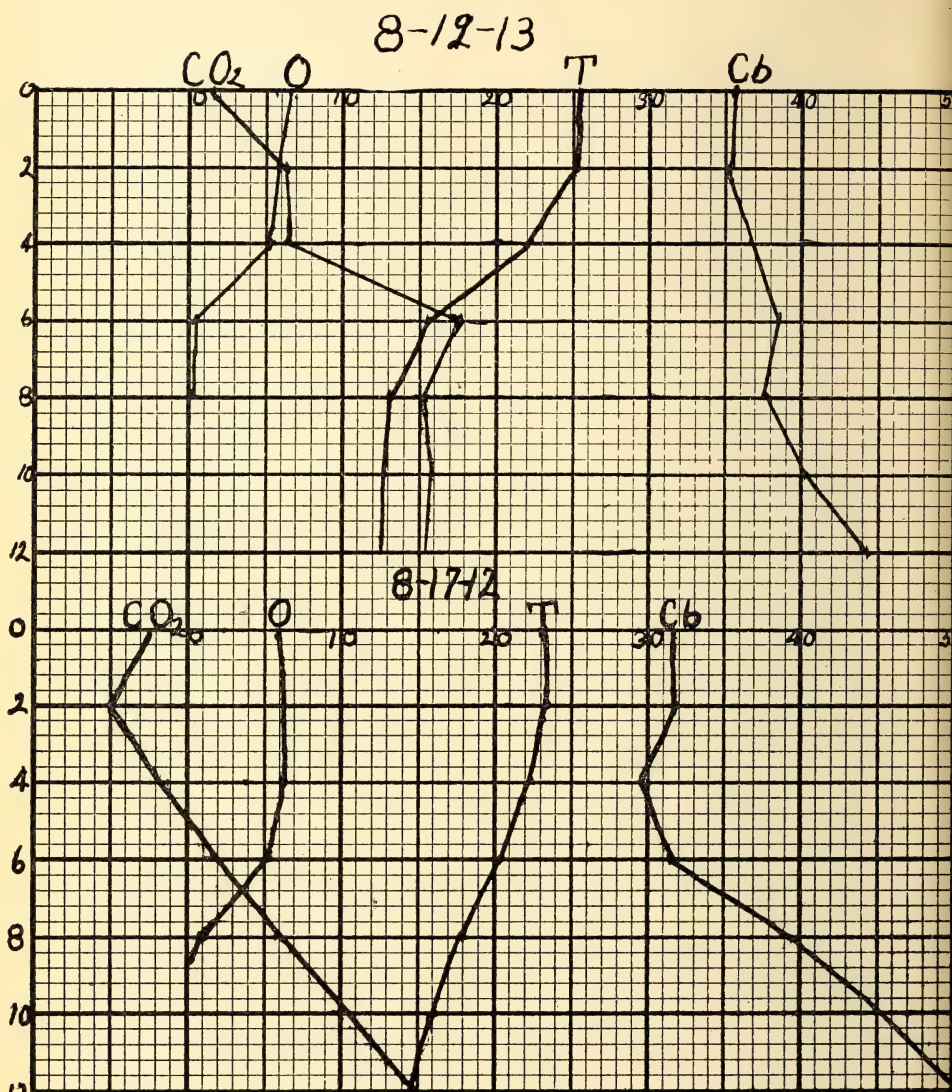
## APPENDIX D: TEMPERATURE AND GAS CURVES

The following curves exhibit graphically the vertical distribution of the temperature and dissolved gases. T=temperature, CO= carbon dioxide, O= oxygen, and Cb = carbon dioxide as carbonate. The vertical spaces indicate the depth in meters. The horizontal spaces represent cubic centimeters of gas or degrees Centigrade.

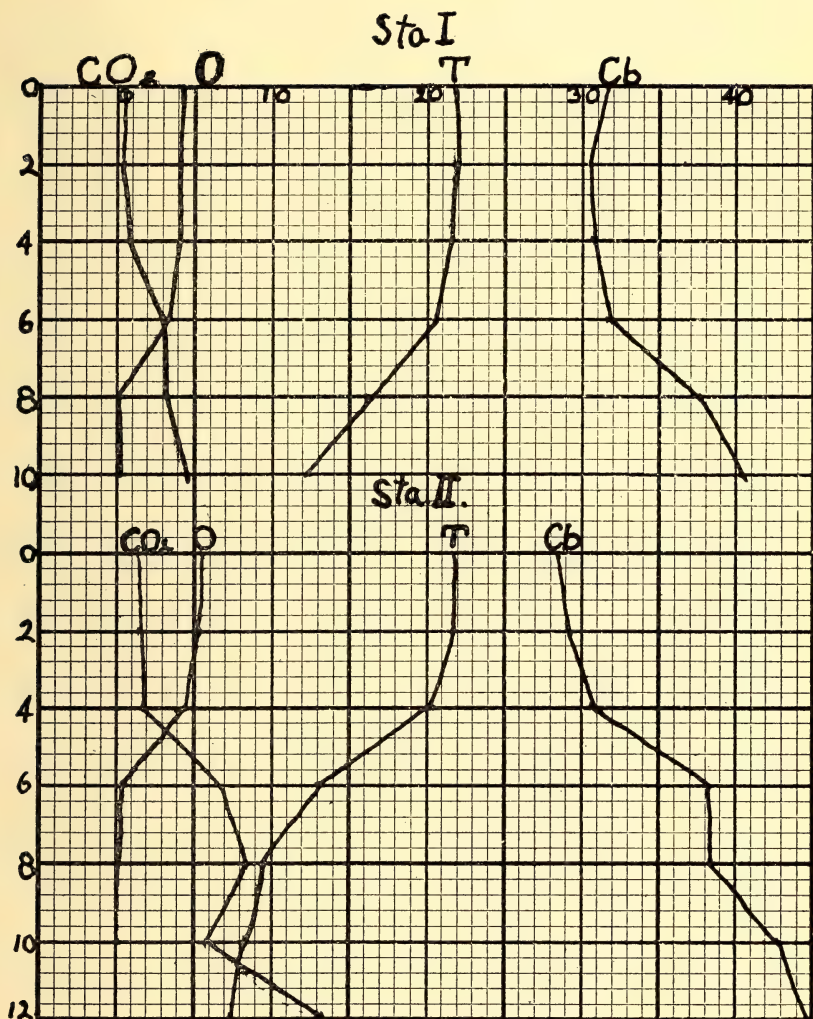




TIPPICANOE LAKE (August 12, 1912)

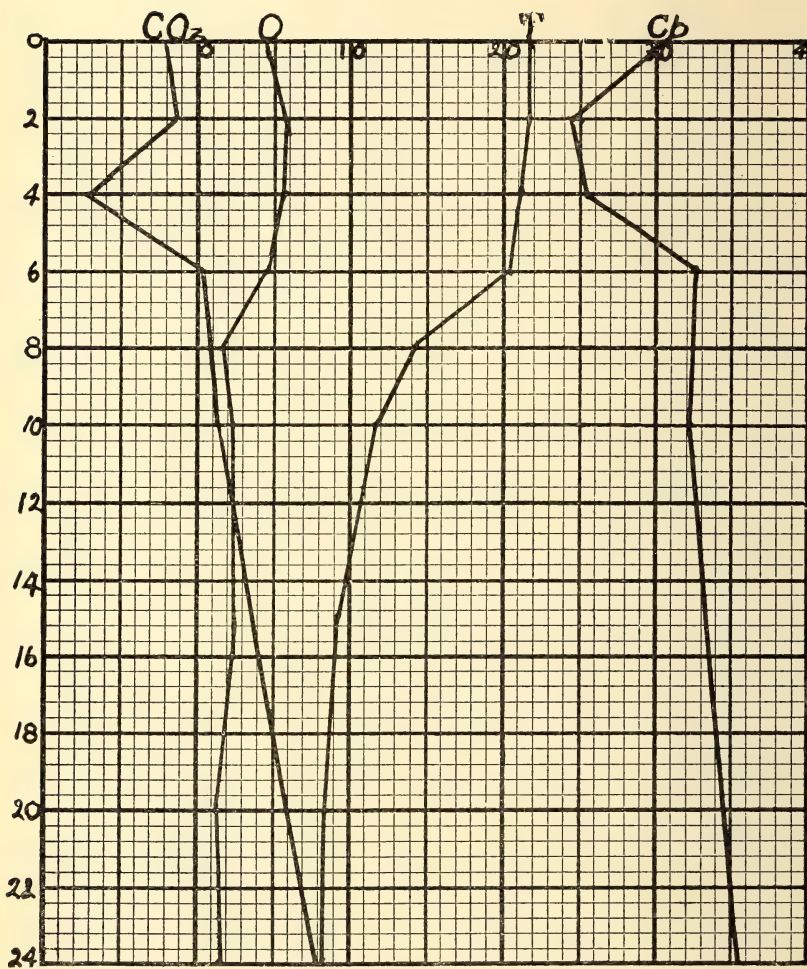


CENTER LAKE (August 12, 1913, and August 17, 1912)



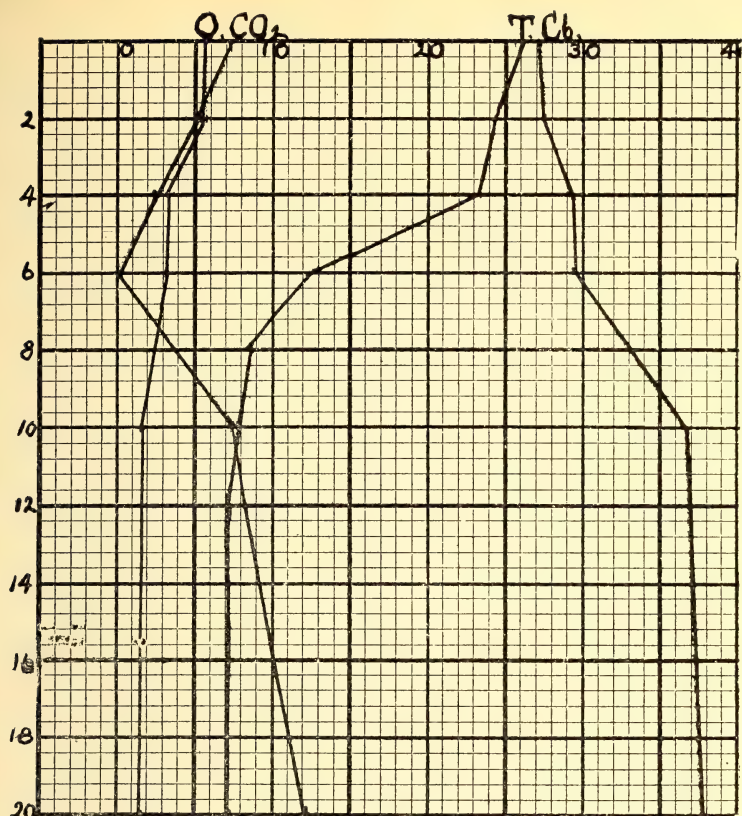
WEBSTER LAKE (July, 3, 1912)



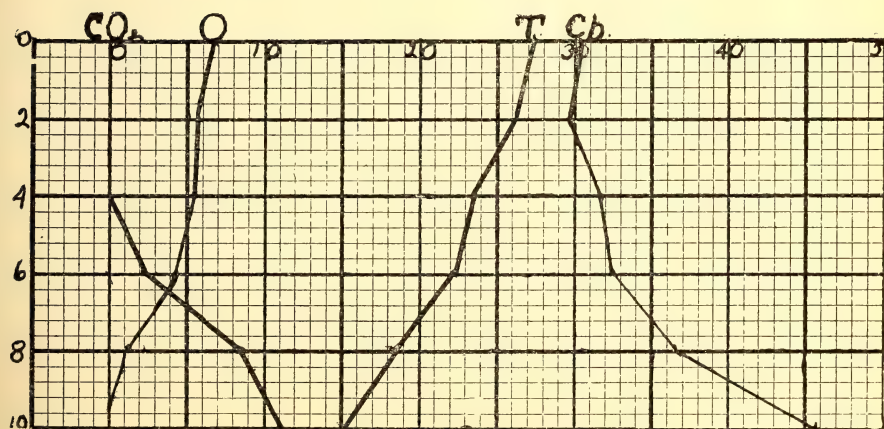


EAGLE (WINONA) LAKE (August 8, 1912)

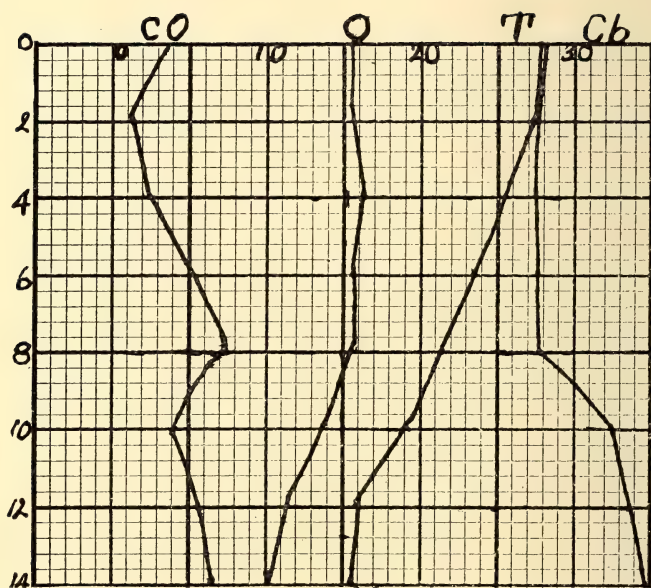




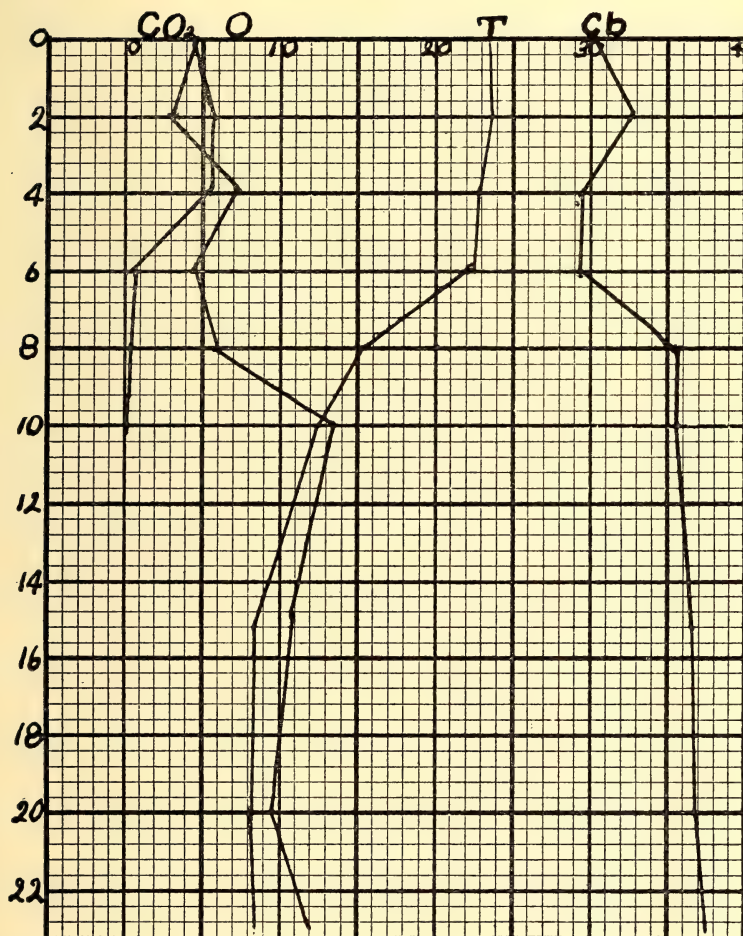
YELLOW CREEK LAKE (August 22, 1912)



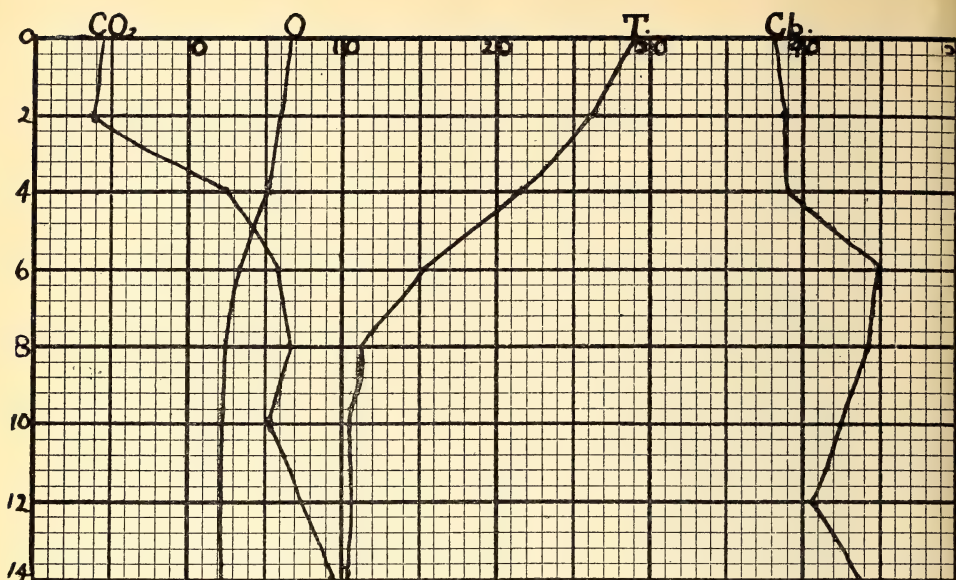
LITTLE EAGLE (CHAPMAN) LAKE (August 2, 1913)



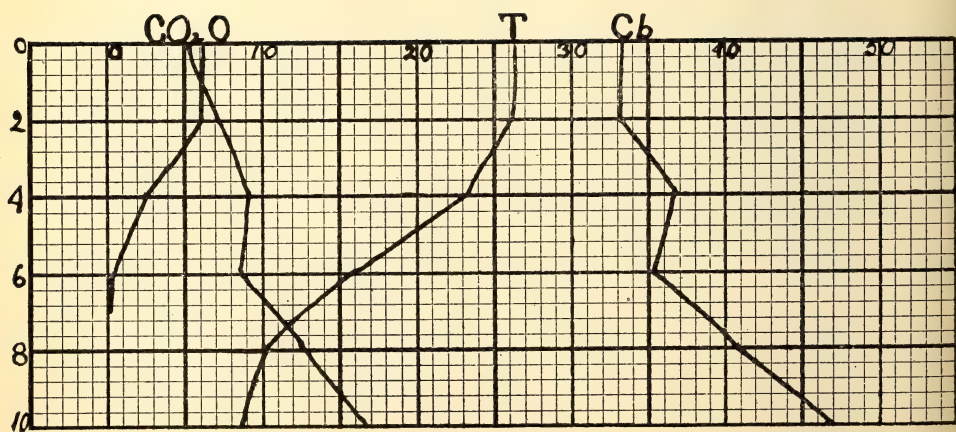
TURKEY LAKE (JULY 31, 1913)



LINGLE LAKE (JULY 26, 1913)

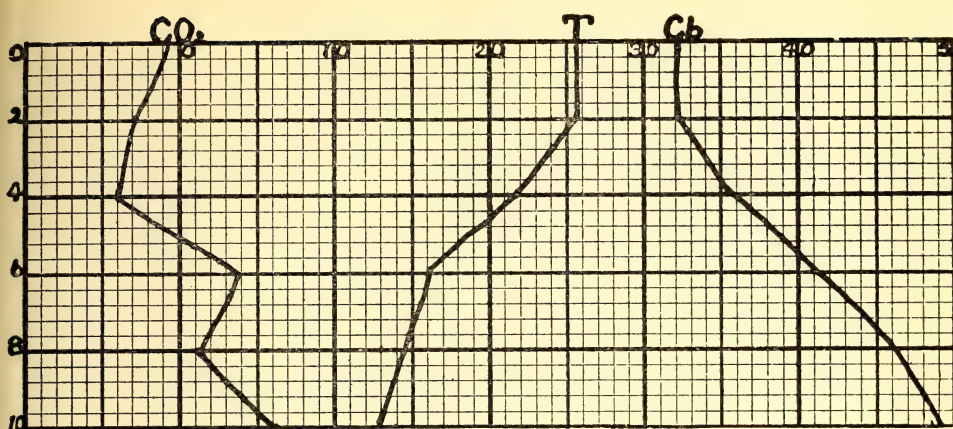


LAKE MANITOU (August 11, 1914)

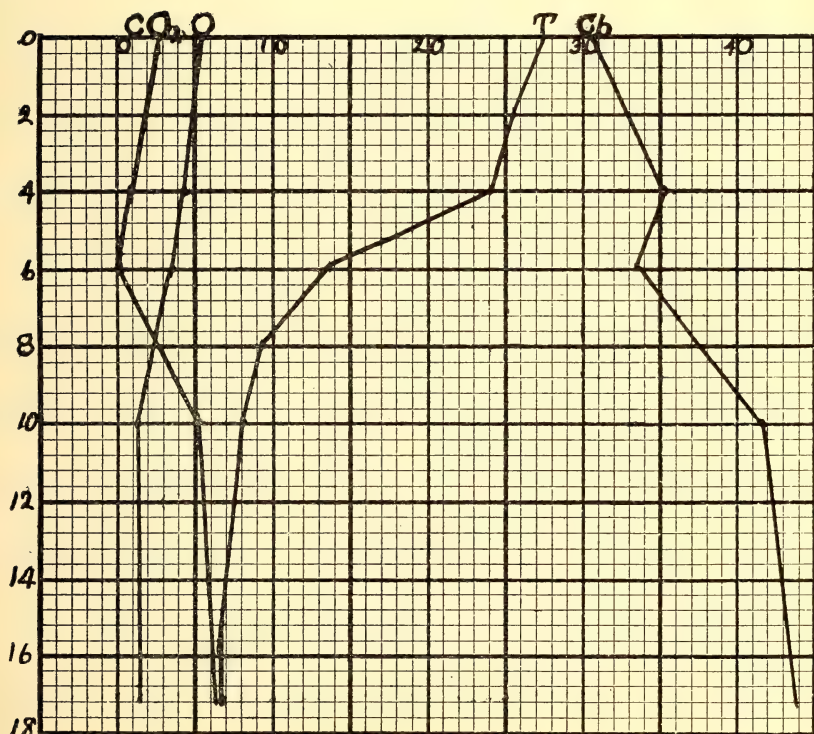


PIKE LAKE (August 17, 1912)





SILVER LAKE (JULY 18, 1912)



PLEW LAKE (August 1, 1914)



















Survey of Indiana Lakes

Conducted by WILL SCOTT

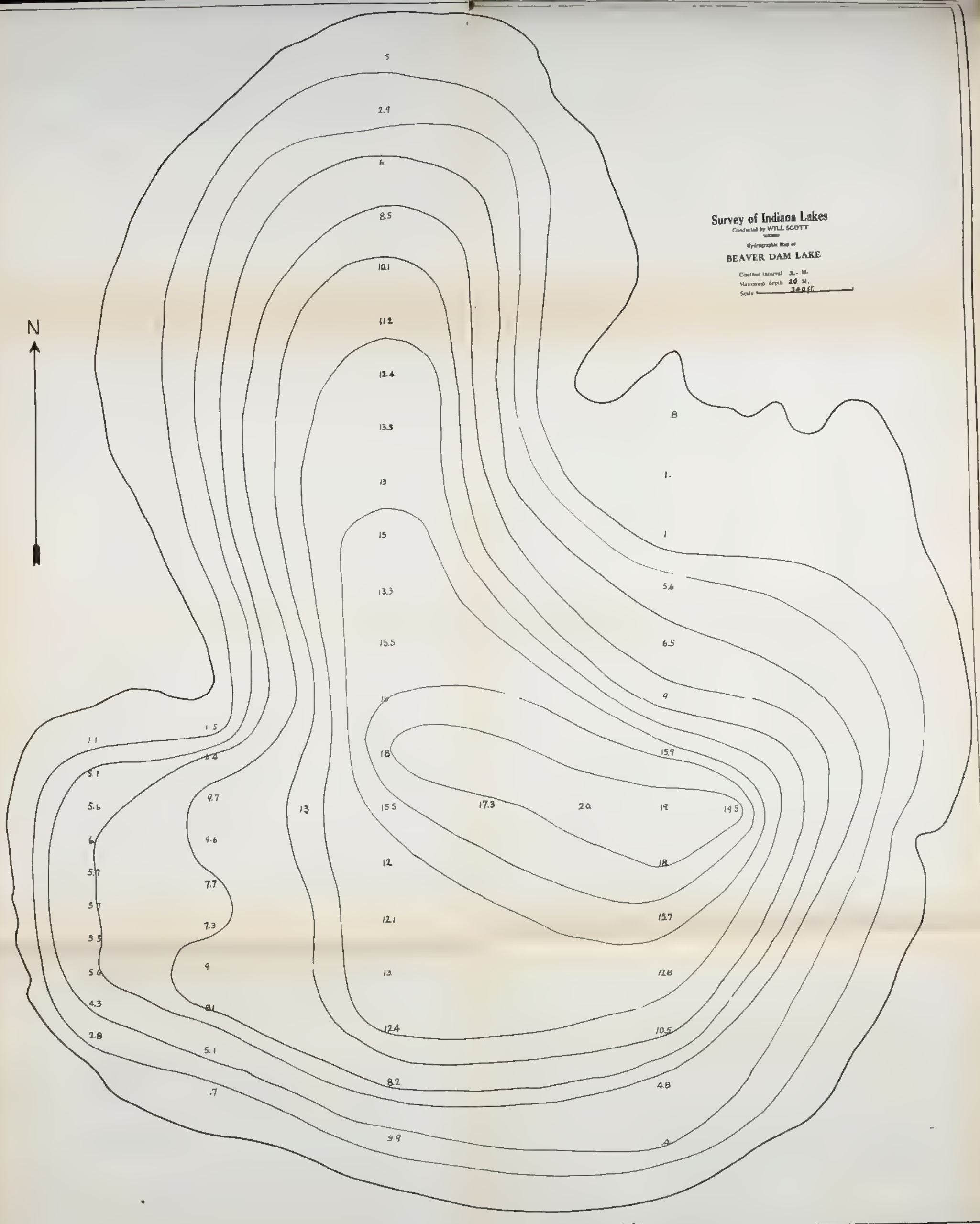
Hydrographic Map of

BEAVER DAM LAKE

Contour interval 2.5 ft.

Maximum depth 20 ft.

Scale 1" = 240 ft.



Model of the world for young

children

by

JOHN HENRY MANN

U.S.A.

NEW YORK







# Survey of Indiana Lakes

Conducted by WILL SCOTT

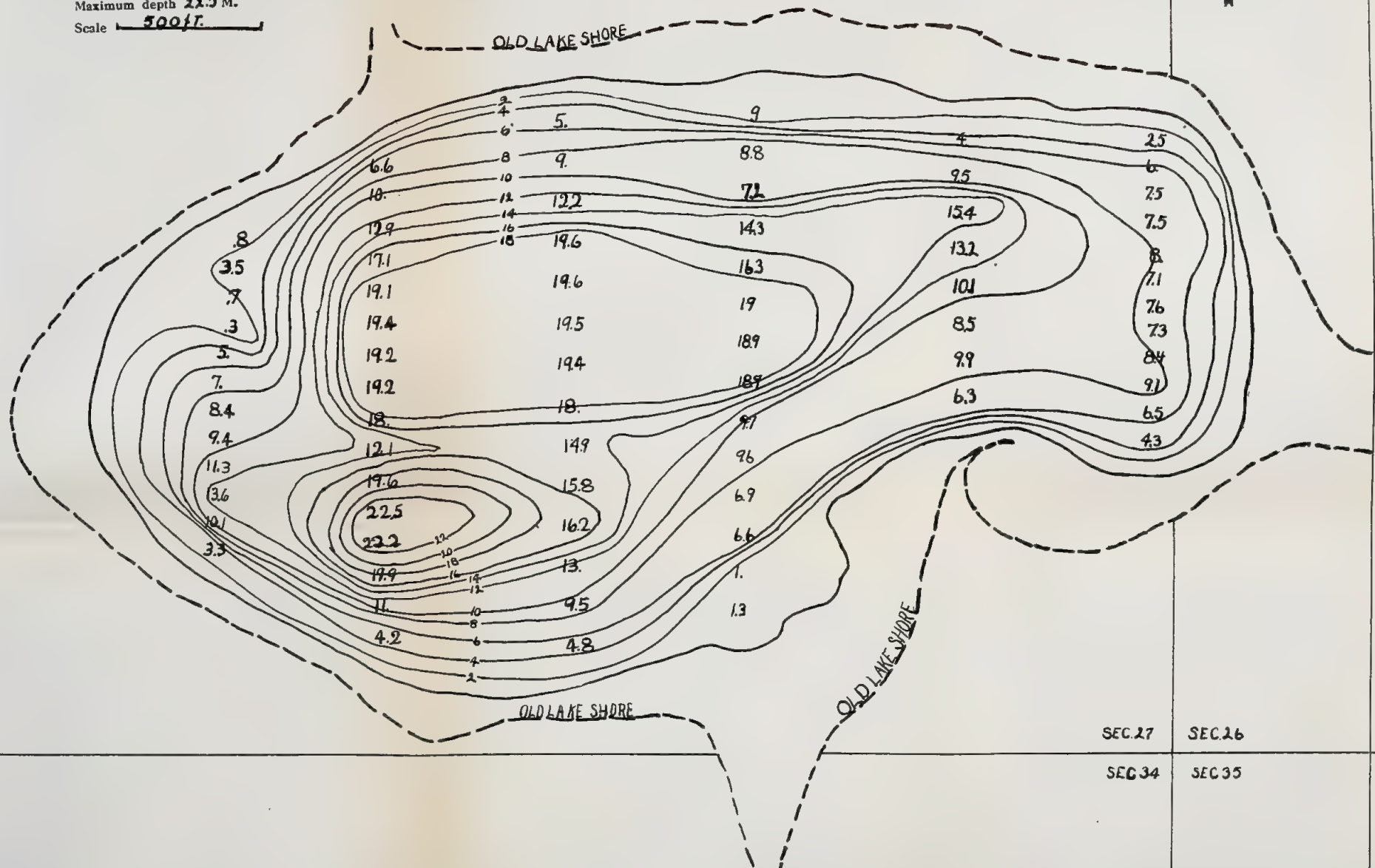
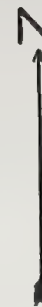
Hydrographic Map of

## YELLOW CREEK LAKE

Contour interval 2. M.

Maximum depth 22.5 M.

Scale 500 ft.



# Survey of Indian Lakes

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Hydrographic Map of

## YELLOW CREEK LAKE

Contour interval 2 ft.

Maximum depth 20 ft.

Scale











Sec. 1.

Sec. 6

# Survey of Indiana Lakes

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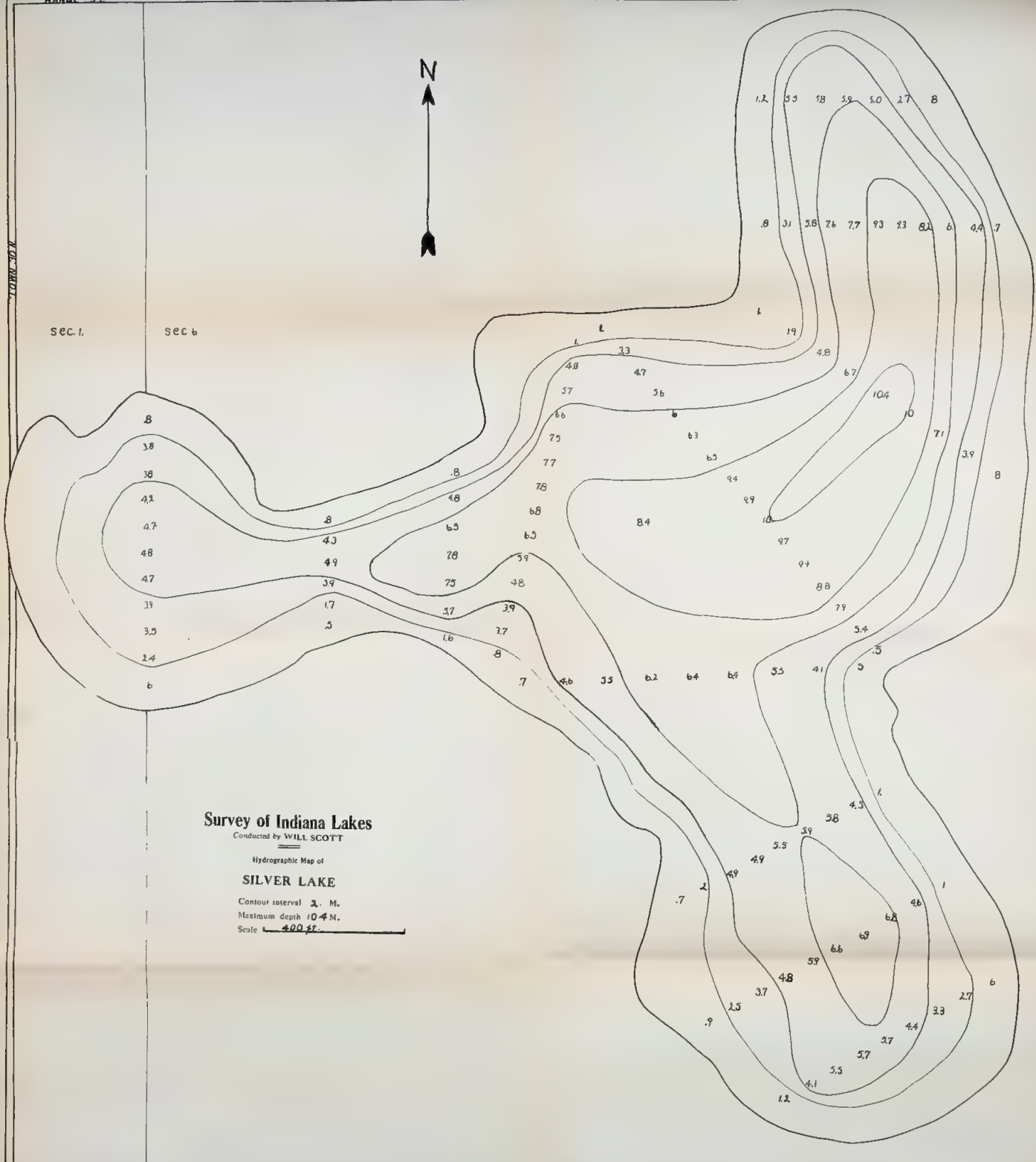
Hydrographic Map of

## SILVER LAKE

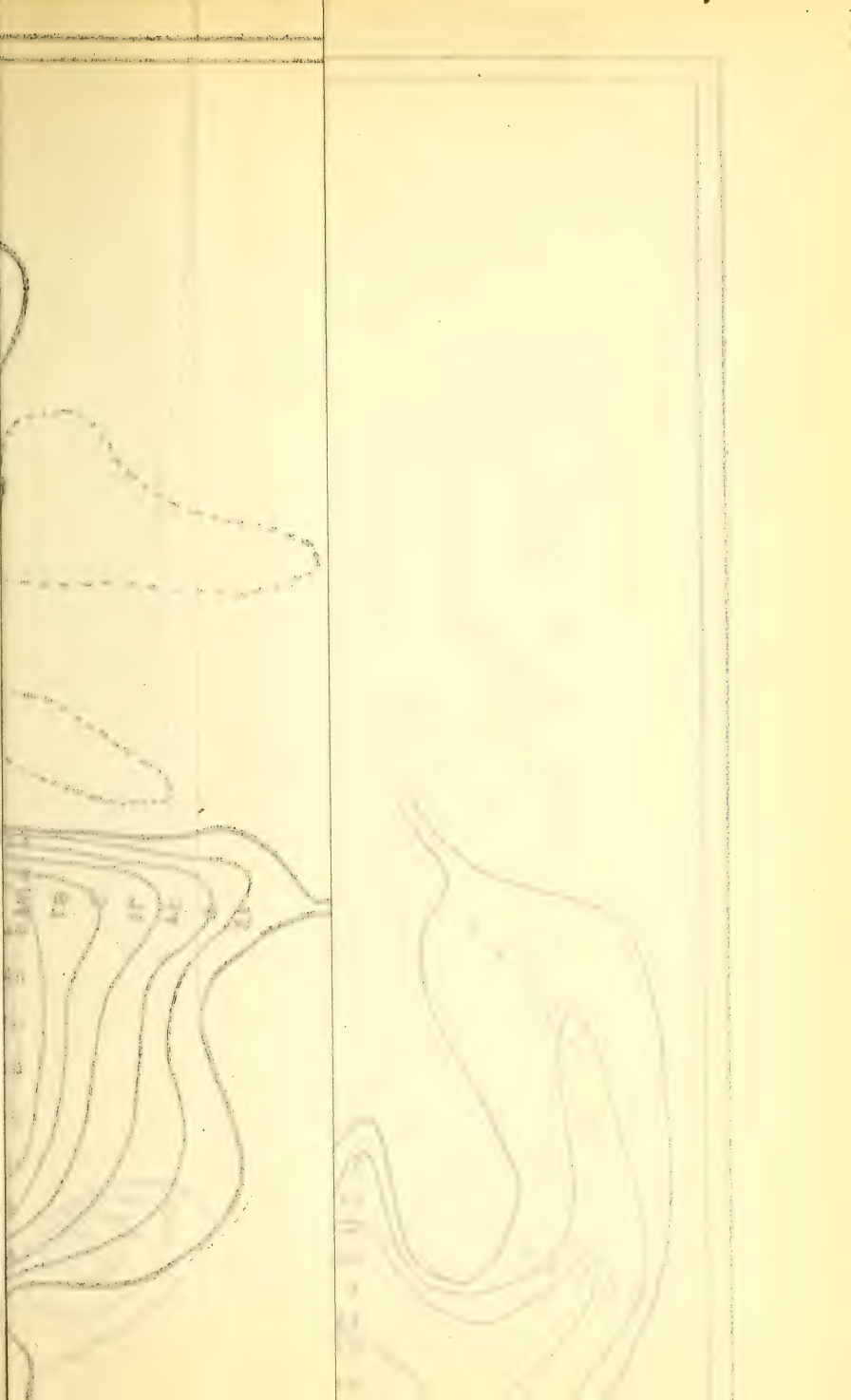
Contour interval 2. M.

Maximum depth 104 M.

Scale 400 ft.

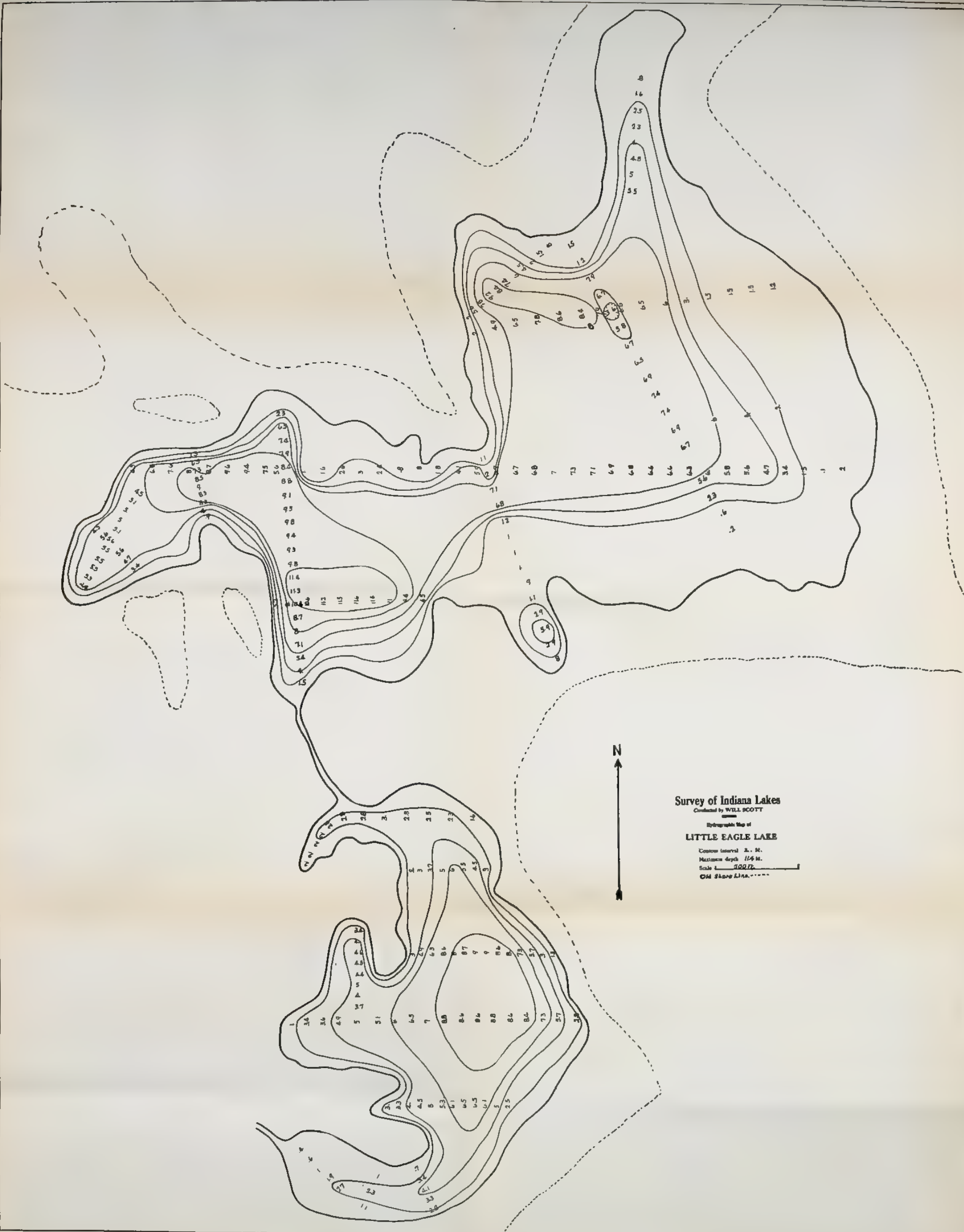












Survey of Indiana Lakes

Conducted by WILL SCOTT

Hydrographic Map of

LITTLE EAGLE LAKE

Contour interval 2.0 ft.

Maximum depth 114 ft.

Scale 1" = 100 ft.

Old Shore Line.....



4

WATER

WATER

WATER

WATER





RANGE 7 EAST

RANGE 7 EAST

TIPPECANOE

WEBSTER

JAMES

**TIPPECANOE-BARBEE  
LAKE REGION**

PLEW

IRISH

BARBEE

HAMMON

DAN KUHN

35

36 \*

31

32

33

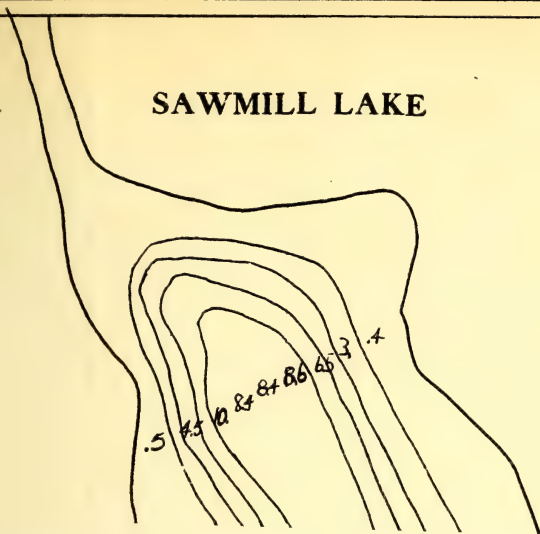
34

35

RANGE 6 EAST

RANGE 7 EAST









# Survey of Indiana Lakes

Conducted by WILL SCOTT

Hydrographic Map of

## IRISH LAKE

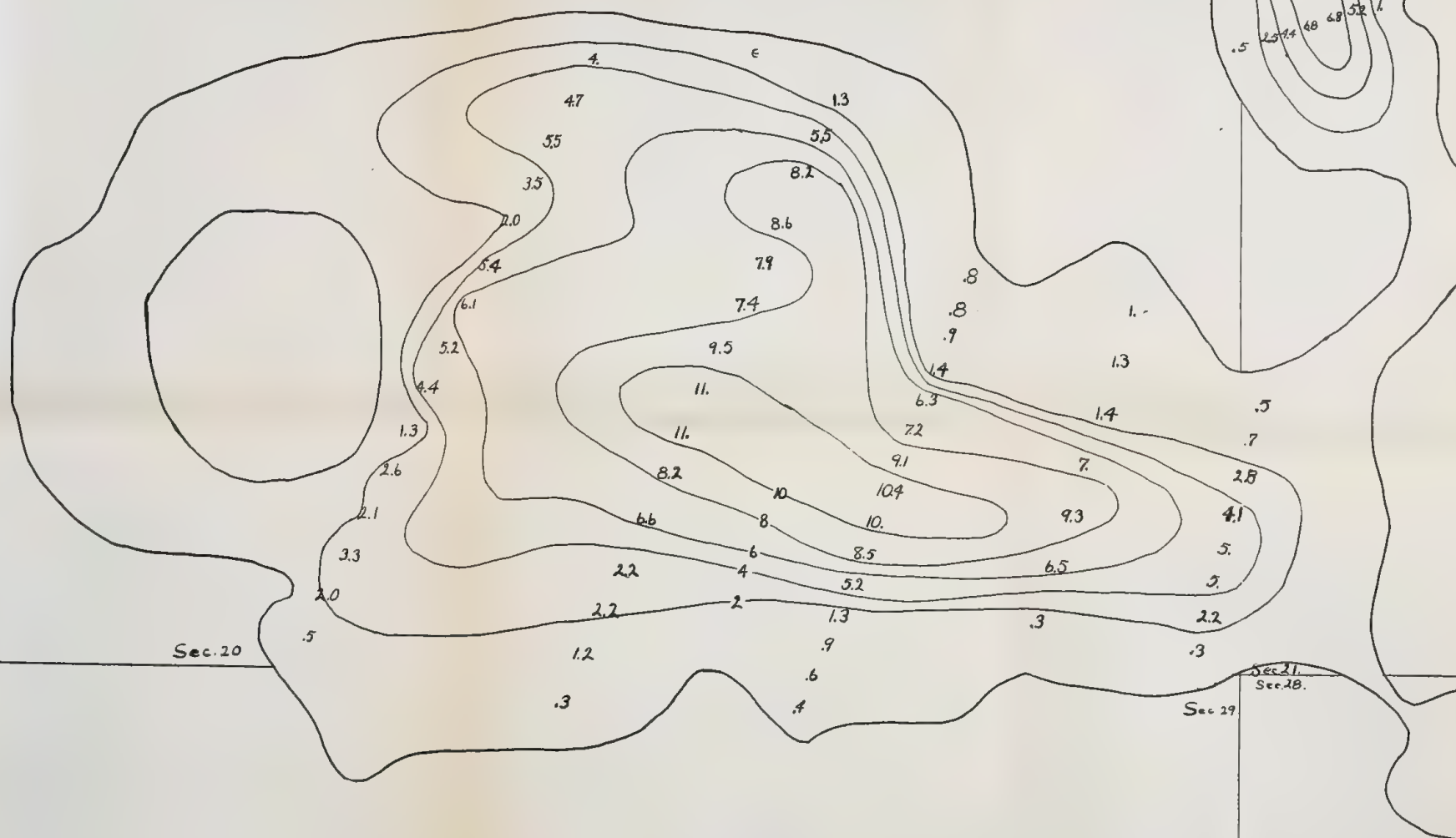
Contour interval 2. M.

Maximum depth 11. M.

Scale 14.7 in. = 1 mi.

N

SAWMILL LAKE



Survey of the

IRISH

of the

of the









RANGE 7E.

SEC. 21.

PLEW LAKE.



**Survey of Indiana Lakes**

Conducted by **WILL SCOTT**

Hydrographic Map of

**LITTLE BARBEE LAKE**

Contour interval **2** M.

Maximum depth **8.2** M.

Scale **7.8 in. = 1 mi.**

SEC. 28

R. 7E.









# Survey of Indiana Lakes

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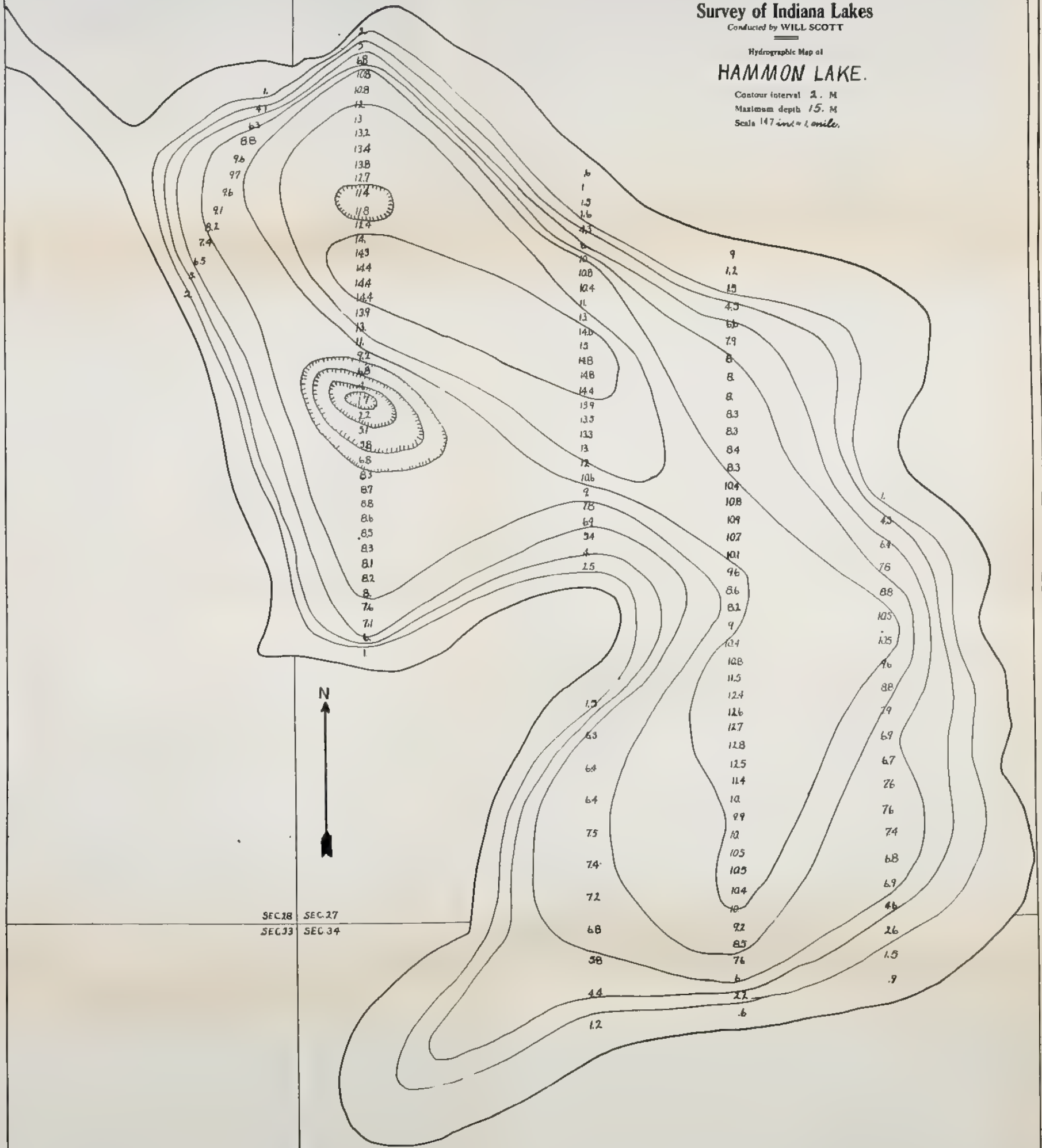
Hydrographic Map of

## HAMMON LAKE.

Contour interval 2. M

Maximum depth 15. M

Scale 147 in. = 1 mile.



Model similar to yours?

HOW MANY TAKE

of the above mentioned  
model is a sample of the  
model is a sample of the

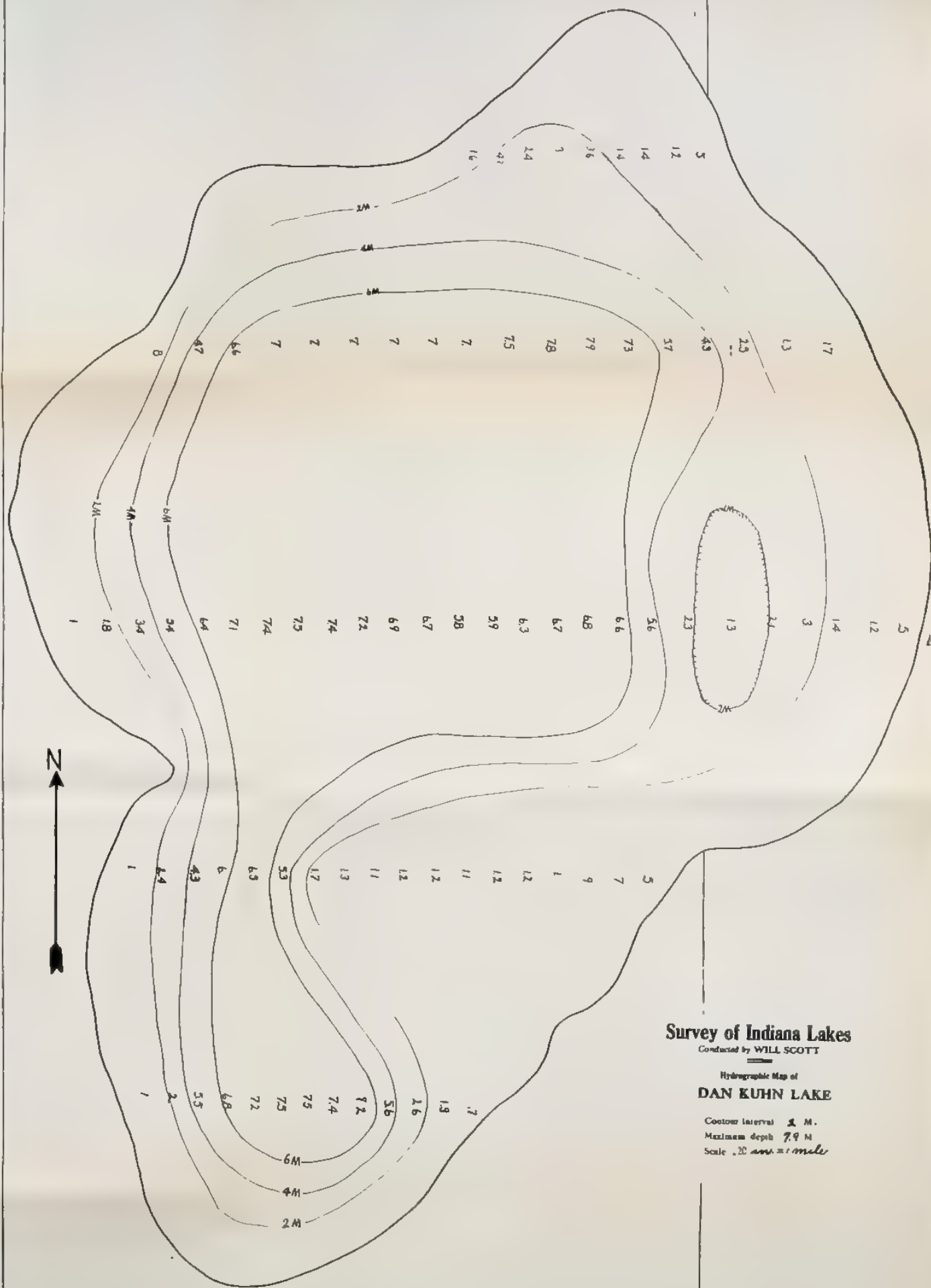


5

.7







# **Survey of Indiana Lakes**

Conducted by WILL SCOTT

Hydrographic Map of

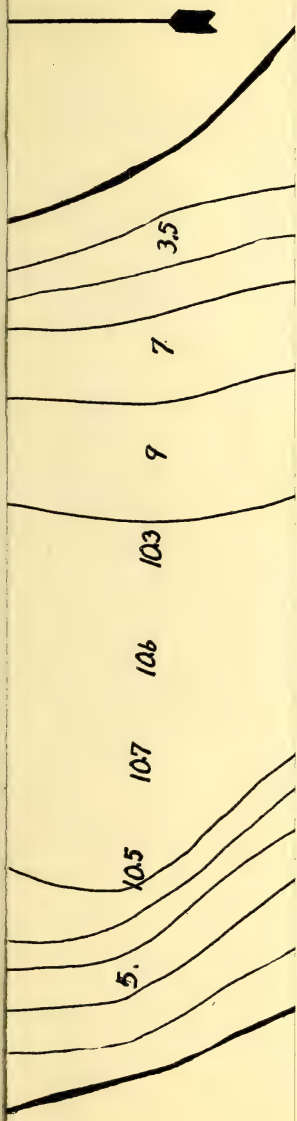
## **DAN KUHN LAKE**

Contour interval 2 M.

Maximum depth 7.9 M

Scale 1:20,000 = 1 mile









# Survey of Indiana Lakes

Conducted by WILL SCOTT

## Hydrographic Map of RIDINGER LAKE

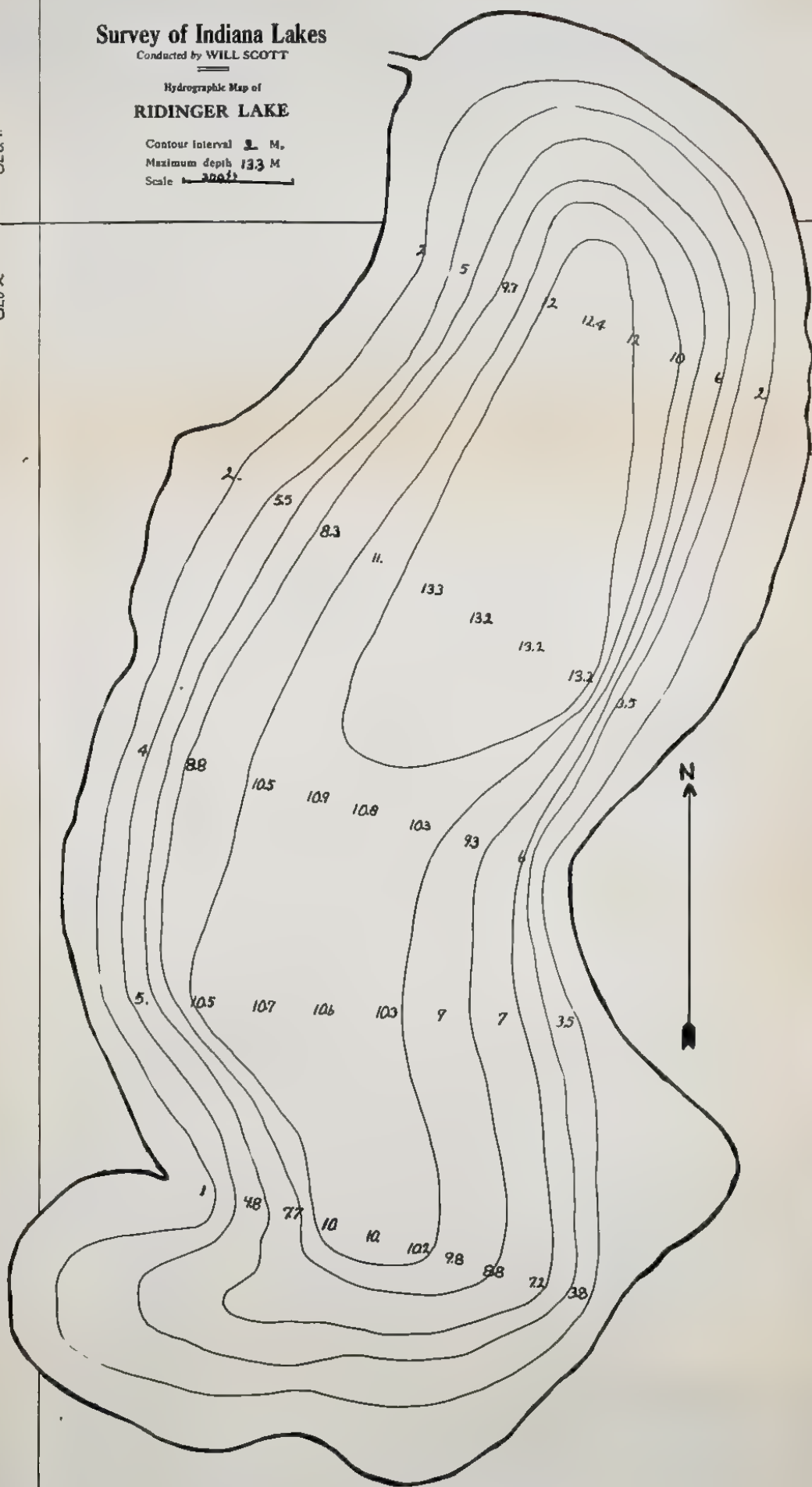
Contour Interval 2 M.

Maximum depth 133 M

Scale 1:2000

SEC. 1

SEC. 2

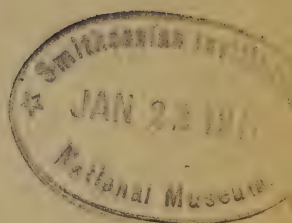


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O  
N

1

# INDIANA UNIVERSITY STUDIES



## Study No. 32

STUDIES IN ARITHMETIC. Edited by MELVIN E. HAGGERTY, Ph.D., formerly Associate Professor of Psychology and Education in Indiana University.

*The INDIANA UNIVERSITY STUDIES are intended to furnish a means for publishing some of the contributions to knowledge made by instructors and advanced students of the University. The Studies are continuously numbered; each number is paged independently.*

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**Study No. 32**

**STUDIES IN ARITHMETIC.** Edited by MELVIN E. HAGGERTY, Ph.D., formerly Associate Professor of Psychology and Education in Indiana University.





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## Prefatory Note

---

This *Study* contains five separate investigations in the learning of arithmetic in Indiana schools. In each instance the Courtis standard tests were used to measure the efficiency of the children whose work was tested. The first two investigations are concerned with the measurement of the actual efficiency of the schools in question near the close of the second semester, 1915. The material for these studies was gathered for the most part thru the Indiana University Bureau of Coöperative Research. For the purposes of this report this material is divided into two parts, one dealing with the city schools, the other with the rural schools. The first, covering 22 city systems, is reported by Mr. M. E. Haggerty. Mr. Paul Mort is responsible for the report on the rural schools of five counties.

In addition to these measurement results there are three investigations on the effects of drill in arithmetic, as follows:

(a) An investigation of the effects of six weeks' daily drill in addition, by Mary A. Kerr, principal of the Department school, Bloomington, Ind.

(b) An experimental investigation of the effects of drill in arithmetical processes under varying conditions, by Herman Wimmer, superintendent of schools in Rochelle, Ill.

(c) An experiment with Courtis Practice Pads, by Flora Wilbur, principal of Fort Wayne training school.

Acknowledgement is due to the numerous school superintendents, principals, and teachers for their services in giving tests and doing the initial work in scoring the results. No less credit is due the University authorities for their coöperation, to President William L. Bryan and the Board of Trustees for the funds with which the work of re-scoring and tabulation was carried on, to the graduate students and assistants who assisted in the work, and to the ever-patient Office of University Publications in whose hands a somewhat chaotic manuscript has taken final shape.

M. E. HAGGERTY.

June 5, 1916.



# I. SECOND REPORT ON THE MEASUREMENT OF ARITHMETIC IN INDIANA CITY SCHOOLS

By MELVIN E. HAGGERTY, Ph.D., formerly Associate Professor of Psychology  
and Education in Indiana University.

## INTRODUCTION

The second report on the measurement of arithmetic in Indiana city schools is based upon tests—Courtis, Series B—which were given in May, 1915. As in the case of the 1914 Study<sup>1</sup>, the tests were given and scored by the local school officers and the results, tabulated for class and school scores, were sent to Indiana University. Twenty-two city school systems reported tests of all or a part of their pupils. Below is given the list of cities and the name of the superintendent or principal thru whom the work was carried on:

|                    |                          |
|--------------------|--------------------------|
| Akron.....         | Supt. H. G. Knight,      |
| Alexandria.....    | Supt. A. L. Trester,     |
| Bloomington.....   | Supt. H. L. Smith,       |
| Bluffton.....      | Supt. P. A. Allen,       |
| Columbia City..... | Supt. J. C. Sanders,     |
| Crown Point.....   | Supt. W. S. Painter,     |
| Decatur.....       | Supt. C. E. Spaulding,   |
| Elwood.....        | Supt. J. L. Clauser,     |
| Fort Wayne.....    | Prin. Flora Wilber,      |
| Huntington.....    | Supt. J. M. Seudder,     |
| Kendallville.....  | Supt. P. C. Emmons,      |
| Mishawaka.....     | Supt. John F. Nuner,     |
| Montezuma.....     | Supt. J. G. Hirshbruner, |
| Noblesville.....   | Supt. E. C. Stopher,     |
| Orleans.....       | Supt. Lewis Hoover,      |
| Poseyville.....    | Supt. O. H. Horrall,     |
| Princeton.....     | Supt. J. W. Stott,       |
| Richmond.....      | Supt. Joe Giles,         |
| Roachdale.....     | Supt. L. E. Michael,     |
| Seymour.....       | Supt. T. A. Mott,        |
| Sheridan.....      | Supt. James W. Kirk,     |
| South Bend.....    | Supt. L. J. Montgomery.  |

<sup>1</sup>M. E. Haggerty. *Arithmetic: A Co-operative Study in Educational Measurements* (Indiana University Studies, No. 27).

In the following pages these cities are indicated by number but the order is not alphabetical.

At the University the tabulated results were re-examined and corrected. The amount of this corrective work was considerable and could not be trusted to careless hands. Where so many thousands of computations are involved the chances for error are very great. Even graduate students require the most careful supervision both as to method and in accuracy of work. Whatever dependability is to be placed in the accuracy of school medians and variabilities is largely due to Miss Mary Kerr, principal of the Department school in Bloomington, who gave her summer vacation chiefly to the examination of the returns from the cities. Assistance was also rendered by Miss Cecile White, fellow in philosophy, and by Mr. Earl Moore, technical assistant in the department of philosophy.

The results of the study are presented in the distribution tables, Tables VI-IX.

The median scores are collected in Table I, which gives the scores in attempts, rights, and dependability for grades 5 to 8 in all of the 22 cities, the medians for Indiana and similar scores for 9 cities and towns in Iowa (1915), and 16 cities and towns in Kansas (1915). Reading across this table for grade 5, the medians for city 1 are: addition—attempts, 7.7 problems; rights, 4.2 problems; dependability 55 per cent. Then follow in order to the right the scores in subtraction, multiplication, and division. The ranking of the several cities is shown in Table II.

The most striking fact about these scores is the wide variation which they show from city to city. City 22 attempts 8.5 problems with 66 per cent of the work correct, while city 2 attempts but 4.4 problems and scores but 35 per cent on this meager effort. Fourteen schools fail to equal the fifth grade score of city 22 in their sixth grades, 9 fail in their seventh grades, and 5 fail in their eighth grades. In these upper grades city 22 likewise excels the median of the entire group, altho it is excelled by city 4 in the sixth grade, by cities 4 and 20 in the seventh grade, and by city 4 in the eighth grade. Compared to the Courtis standard, city 22 is in all grades below the level of efficient work. Much more are also the cities which are inferior to city 22.

The difference in median scores is so great as to suggest not the distribution of schools more or less closely about a common center but the existence of actually different types of schools.



Note the sixth grade division scores in cities 15 and 16. The one is 8 problems correctly solved; the other is 2, or one-fourth the score of the first. The multiplication rights for city 17 is 3.1; for city 12 it is more than double. The number of subtraction rights of city 2 is 5.3; for city 21 it is 9. The minimum score in addition is 3.4 rights for cities 1 and 7, and for city 4 it is 7.5. It is the same story for all the grades. Think of such ranges of efficiency as 4.4 to 9, 7 to 11.2, 6.5 to 12, and 7.0 to 12.1 for the eighth grade; and 4.1 to 9, 4.2 to 8.4, and 4 to 9 for the seventh grade. There are 8 eighth grades as low as the median of all seventh grades in addition, and 2 as low as the median of all sixth grades, and 1 whose median is but .2 above the median of all fifth grades, while there are 1 sixth grade and 4 seventh grades higher than the median of all eighth grades. For a correct appreciation of these figures it must be remembered that they do not represent individual children. There are in all groups half the individuals below the median score and half above. How much wider then must be the range between the lowest 10 per cent of the lower group and the upper 10 per cent of the upper group!

The facts represented by these numbers appear more emphatic when shown in graphic form as in Figures 1 to 4. Here you see at a glance the enormous amount of overlapping existing from grade to grade. In general the fifth grade scores (triangles) are grouped at the lower lefthand corner of the figure, and the eighth grade scores (stars) are found at the upper righthand part, with the sixth grade scores (squares) and the seventh grade scores (circles) sprinkled between. In the center of the figure the symbols of the several grades mingle in a most disorderly fashion. The amount of overlapping would be simply astonishing if we had not learned to expect such results from the application of standard tests.

In Figure 5 is shown the overlapping of the fifth and seventh grades in the several schools within a single city. The seventh grade medians for both attempts and rights are clearly above those of the fifth grade, thus showing in general a superior achievement for the upper grade. On the other hand, in a large number of schools the fifth grade work is superior to that of many seventh grade classes in the same system and in one case the more advanced class is inferior to the fifth grade class within the same school.

## CAUSES OF VARIABILITY IN SCORES

There are but two possible causes for the variability of scores. One is the variability in original endowment of children. The other is the effectiveness of environmental conditions on the growth and development of children. If we should accept the first hypothesis as an adequate explanation of the variability found in these scores we must argue that in those schools with low scores we have children of less than average ability and that other cities attain high scores because their children are unusually gifted. Two things are against such an explanation. First, there is no conclusive evidence from the experimental studies of individual differences that such widely separated types of individuals are to be found among such fairly homogeneous populations as live in these Indiana cities. The second obstacle to such a theory is that you get widely different results within the same cities and within the same school. Thus city 2 scores 6.5 in the eighth grade addition and but 1.5 in the fifth; city 4 is 40 per cent above the median in sixth grade addition and 14 per cent below the median in multiplication in the same grade. Such facts as these do not indicate differences of mental endowment on the part of the children. They rather indicate ill-adapted environmental conditions. These environmental conditions may be divided into two groups, the school and the non-school. The latter comprise such facts as conditions of family life, feeding, recreation, and outside work. Of the great importance of such factors as bearing upon school work there can be no doubt. There is, however, no reason to believe that such conditions are peculiar to any city in a manner adequately to account for the variability of scores. In fact, some cities and individual schools in the poorer sections of other cities show approximately as good work as do the better-cared-for children in the more favored localities.

With these possible explanations eliminated we must recur to the differences in the school conditions to account for the differences in the scores. Where one city scores higher than another, the difference is probably due to the fact that the school conditions in the one city are superior to those of the city with the lower score. When city 20 scores 100 per cent in dependability in division in three grades it means that the administrative and teaching force in that city have learned how to teach division effectively, and when city 7 makes but 58 per cent in eighth grade addition, while scoring much higher in the other processes,

it means that city 7 has not learned how to teach addition as effectively as the other subjects. The variability in median scores probably indicates more or less accurately the differences in teaching methods, and if any city is to secure a change in score it will do so by changing its methods of instruction.

### SPEED AND ACCURACY

One of the common causes urged for a low dependability is that the children work too rapidly. The evidence in this table of medians is directly contrary to that argument. Twenty-four grades which fall below 60 per cent in dependability have a median score in attempts of 7.1, while 11 grades which scored from 70 to 75 have a median score of 7.7, and the 7 cities which score above 75 per cent in accuracy have a median of 9.8. These figures would seem to justify the statement that the more rapid the work the more accurate it is. Whether this extreme statement could be justified may well be doubted. The ratio between accuracy and speed is probably an individual matter, and there are certain limits of speed within which an individual does his best work. If he is pushed beyond this limit he loses in accuracy; likewise if he is slowed down too much he tends to become inaccurate. No one has yet determined for children in general or for any individual child in particular the limits within which he will do his best work in any subject.

The value of speed in securing greater accuracy is doubtless a function of attention. When the mental processes are rapid their inhibitory power is greater and, hence, the subject is less open to distraction from interfering stimuli. He has concentrated attention. To slow down these processes weakens their resistance, and contending neural impulses get the right of way with consequent dispersed attention, providing the condition for inaccurate work. For this reason many children would be rendered more accurate if they were speeded up within certain limits.

### STANDARD SCORES AND CHARTS

One cannot from the median score of a class judge the efficiency of that class except in reference to a standard of achievement for a class of that grade. In the 1914 study<sup>2</sup> we published a chart which we called the Indiana Standard. The form of the chart was

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<sup>2</sup>M. E. Haggerty. *Arithmetic: A Co-operative Study in Educational Measurements (Indiana University Studies, No. 27)*.

determined by the median scores in attempts and rights for each of the processes for grades 5 to 8. The assumption was that the score attained or exceeded by one-half of all the pupils was a minimum ideal for the grade in question. This assumption was, of course, quite arbitrary, and its chief justification was that it established a point of reference for judgments in specific cases. It seems hardly worth while to make a chart from the 1915 median scores, inasmuch as the alterations would not be great and would serve no very useful purpose. Two charts made on another basis are presented in Figures 5 and 6. Indiana Standard B is based on those scores which were made or exceeded by the children in at least three cities. The several scores do not all come from the same cities but were taken from Table I wherever they occurred, selection of any score being based on the number of rights. In a similar fashion Indiana Standard C was made from the highest scores in rights occurring in Table I.

The value of these standards, while still arbitrarily chosen, is that they offer an ideal that is beyond mediocrity and yet is within the limits of what has actually been accomplished. Chart C is the most exacting standard and is attained by less than 5 per cent of the classes. More than 15 per cent of the cities attained Standard B in one or more classes.

In the charts the scores used as standards are represented by short horizontal lines across the page so drawn as to appear at mid-section of the vertical dimension. These lines are the Standards. Each vertical line represents the scale for the test in question. The first, third, fifth, etc., lines represent the number of problems attempted in the several tests in the several grades. The second, fourth, sixth, etc., lines in a corresponding manner scale the examples right. The portion of each line below the Standard is proportional to the difference between zero and the median score. It is accordingly scaled into the proportional number of parts. The part of the line above the Standard is similarly scaled. Each vertical line is therefore a different scale from every other vertical line, since the score is different in every case.

It is possible on this form to graph the results from any class, school, or city and to see quickly its relative standing. To do this you locate the proper score on its appropriate vertical line. If you join the points so located on the attempts scale by a solid line with the similar point on the rights scale, you have represented the dependability of the work. If the line so drawn is parallel



to the Standard the per cent of dependability is the same as the Standard. If the line slants upward to the right, the dependability is greater; if the line slants downward to the right, the dependability is less.

Continued investigation of achievement in arithmetical subjects should lead some time to a standard much less arbitrary than the ones here presented. To escape the charge of arbitrariness a standard must have due regard to the following conditions:

- (a) The degree of efficiency required for the successful pursuit of the vocations into which children will later go.
- (b) The degree of achievement required at each grade in order to insure such efficiency in the end.
- (c) The time allotment necessary to secure such efficiency at each step.
- (d) The proper relation of efficiency in the fundamentals to efficiency in other arithmetical subjects.
- (e) The proper relation of efficiency in the fundamentals of arithmetic to the necessary requirements in every other subject which schools teach and to the other important school interests.

At the present time only the barest beginning has been made in determining the adequate answer to any one of these demands, and until such an answer is actually determined we must content ourselves with the highly arbitrary standards which we have. In this connection it is interesting to compare the median scores in Indiana schools with similar scores from Iowa<sup>3</sup> and Kansas<sup>4</sup>. These medians are given in Table I, and shown graphically in Figures 7 and 8. The Kansas medians are derived from 19 cities; those from Iowa are from 9 cities. As in Indiana, the total number of children is somewhat less than 10,000 in each State. Graphed on the Indiana Standard both States appear higher, Iowa strikingly so. Searching the Indiana table of medians it is difficult to find any city as high as the Iowa median in all points. For the sake of comparison with the best of the Indiana cities, Table V is constructed showing the 5 cities containing the highest scores and the median scores of the 5. If the Indiana study had been based upon these 5 cities the Indiana scores would have been clearly above those of Kansas but not equal to those of Iowa.

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<sup>3</sup>An unpublished study by Ernest J. Ashbaugh.

<sup>4</sup>Walter S. Monroe. *A Report of the Use of the Courtis Standard Research Tests in Arithmetic in Twenty-four Cities.* Emporia, Kan.



The best Indiana scores, however, are above the Iowa median. If all the Indiana cities could have done as well as the best they could have equalled Iowa. This fact gives plausibility to the Iowa scores and renders them a more practical ideal than they would otherwise seem to be.

It should be noted, however, that no State score equals Mr. Courtis' ideal of 100 per cent accuracy. Some cities, however, do occasionally reach or approach that level and more often in division than in any other process.

#### COMPARISON OF 1915 SCORES AND 1914 SCORES FROM NINE CITIES

Opportunity offers for comparison of the 1915 scores in nine cities with the 1914 scores in the same cities. These are cities 3, 5, 6, 7, 8, 9, 12, 15, and 18. The medians for the two years are shown in Tables III and IV. Table III shows the 1914 fifth, sixth, and seventh grade medians with the medians of the sixth, seventh, and eighth grades of 1915. Here you presumably have a year's growth in the same children. (This is, of course, not exactly true, for the composition of the grades has changed somewhat within that time.) With but rare exceptions the children of each grade in each city have made a substantial gain in achievement, thus showing that with the schools working as they do, the pupils have the opportunity to grow. Did the schools actually improve their teaching methods during the year? The answer to this question is found in Table IV where the several grades of 1915 are compared with the corresponding grades of 1914. There seems little doubt that improvement occurred in the eighth grade but not so markedly in the other grades. Some cities improved more than others; some did not do so well as in the previous year. As a whole, the improvement is not marked. The teachers seem either to have approached the limit of their power to teach, or they do not know how to make improvement in their methods.

## TABLES AND CHARTS



|            |      |      |     |      |      |     |      |      |     |      |      |     |      |      |     |      |      |     |      |      |     |      |      |     |          |
|------------|------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|----------|
| 17.....    | 8.5  | 4.4  | 52  | 11.3 | 8.4  | 74  | 11.6 | 7.4  | 63  | 8.6  | 7.1  | 84  | 7.8  | 4.2  | 54  | 9.0  | 6.4  | 71  | 8.3  | 5.0  | 60  | 7.2  | 4.0  | 55  | .....17  |
| 18.....    | 11.5 | 6.6  | 62  | 12.0 | 8.4  | 70  | 11.4 | 7.6  | 66  | 11.4 | 9.4  | 82  | 9.3  | 5.1  | 55  | 10.4 | 7.4  | 72  | 9.1  | 5.9  | 65  | 8.9  | 7.5  | 85  | .....18  |
| 19.....    | 7.8  | 5.4  | 69  | 9.6  | 8.3  | 87  | 8.7  | 7.1  | 82  | 7.9  | 7.0  | 89  | 7.1  | 4.1  | 67  | 7.8  | 6.5  | 84  | 7.4  | 6.0  | 81  | 6.7  | 5.9  | 89  | .....19  |
| 20.....    | 10.3 | 7.7  | 75  | 13.0 | 11.2 | 86  | 13.7 | 12.3 | 90  | 10.7 | 10.7 | 100 | 10.0 | 9.0  | 90  | 10.0 | 8.2  | 82  | 10.2 | 8.4  | 82  | 9.0  | 9.0  | 100 | .....20  |
| 21.....    | 9.0  | 5.6  | 63  | 10.8 | 9.2  | 86  | 9.2  | 6.7  | 73  | 8.5  | 7.4  | 87  | 8.6  | 5.4  | 63  | 10.7 | 8.8  | 82  | 8.8  | 6.6  | 75  | 8.8  | 7.4  | 84  | .....21  |
| 22.....    | 10.5 | 8.0  | 77  | 12.6 | 10.9 | 87  | 11.9 | 9.5  | 80  | 12.7 | 12.1 | 96  | 10.3 | 6.6  | 65  | 11.0 | 8.5  | 78  | 11.0 | 8.3  | 76  | 9.0  | 7.9  | 88  | .....22  |
| Medians..  | 9.5  | 6.3  | 67  | 10.9 | 8.9  | 82  | 9.9  | 7.3  | 74  | 9.7  | 8.4  | 87  | 8.9  | 5.7  | 64  | 9.9  | 7.9  | 80  | 8.5  | 6.0  | 71  | 7.8  | 6.5  | 84  | Medians  |
| Iowa.....  | 10.3 | 7.4  | 72  | 12.9 | 11.1 | 86  | 11.6 | 9.6  | 83  | 12.0 | 11.1 | 93  | 9.4  | 6.6  | 70  | 11.0 | 9.2  | 83  | 10.4 | 8.2  | 79  | 9.0  | 8.0  | 89  | ....Iowa |
| Kansas...  | 9.8  | 6.9  | 71  | 11.5 | 9.9  | 86  | 10.9 | 8.9  | 82  | 10.9 | 10.0 | 92  | 8.7  | 5.8  | 67  | 10.0 | 8.3  | 83  | 9.0  | 7.0  | 78  | 9.3  | 8.1  | 87  | ..Kansas |
| Courtis... | 12.0 | 12.0 | 100 | 12.0 | 12.0 | 100 | 11.0 | 11.0 | 100 | 11.0 | 11.0 | 100 | 11.0 | 11.0 | 100 | 11.0 | 11.0 | 100 | 10.0 | 10.0 | 100 | 10.0 | 10.0 | 100 | ..Curtis |

TABLE I.—MEDIAN SCORES: ATTEMPTS, RIGHTS, DEPENDABILITY

MEDIAN OF ALL INDIVIDUALS IN TWENTY-TWO INDIANA CITIES COMPARED WITH IOWA AND KANSAS MEDIANS, 1915—(Con.)

| CITY    | GRADE 6  |     |               |             |     |        |                |          |    |          |               |          | GRADE 5  |        |               |             |     |        |                |          |    |          |               |    | CITY |
|---------|----------|-----|---------------|-------------|-----|--------|----------------|----------|----|----------|---------------|----------|----------|--------|---------------|-------------|-----|--------|----------------|----------|----|----------|---------------|----|------|
|         | Addition |     |               | Subtraction |     |        | Multiplication |          |    | Division |               |          | Addition |        |               | Subtraction |     |        | Multiplication |          |    | Division |               |    |      |
|         | Rights   |     | Dependability | Attempts    |     | Rights | Dependability  | Attempts |    | Rights   | Dependability | Attempts |          | Rights | Dependability | Attempts    |     | Rights | Dependability  | Attempts |    | Rights   | Dependability |    |      |
|         | Attempts |     |               |             |     |        |                |          |    |          |               |          |          |        |               |             |     |        |                |          |    |          |               |    |      |
| 1.....  | 8.9      | 3.4 | 48            | 9.4         | 7.3 | 78     | 7.4            | 4.9      | 67 | 5.8      | 4.4           | 77       | 7.7      | 4.2    | 55            | 7.8         | 5.3 | 69     | 6.1            | 3.5      | 58 | 4.9      | 2.9           | 61 | 1    |
| 2.....  | 7.4      | 4.4 | 60            | 8.1         | 5.3 | 65     | 6.9            | 3.9      | 56 | 6.0      | 4.1           | 68       | 4.4      | 1.5    | 35            | 6.3         | 5.0 | 80     | 6.4            | 3.6      | 57 | 4.8      | 2.2           | 45 | 2    |
| 3.....  | 7.2      | 4.1 | 57            | 7.8         | 5.8 | 75     | 6.4            | 4.0      | 64 | 5.5      | 4.2           | 77       | 6.0      | 3.3    | 55            | 6.4         | 4.0 | 63     | 5.3            | 3.0      | 57 | 4.4      | 2.4           | 55 | 3    |
| 4.....  | 9.9      | 7.5 | 76            | 8.5         | 6.6 | 78     | 6.9            | 4.4      | 64 | 6.1      | 4.5           | 77       | 8.3      | 4.8    | 58            | 7.9         | 5.3 | 67     | 6.9            | 4.0      | 58 | 5.7      | 3.8           | 66 | 4    |
| 5.....  | 6.7      | 4.6 | 69            | 7.5         | 6.0 | 81     | 7.5            | 4.8      | 65 | 5.5      | 4.4           | 81       | 5.7      | 3.7    | 65            | 7.1         | 5.0 | 71     | 5.4            | 3.6      | 67 | 4.4      | 2.8           | 64 | 5    |
| 6.....  | 6.4      | 4.2 | 66            | 6.9         | 5.8 | 85     | 5.8            | 4.2      | 72 | 4.8      | 3.6           | 76       | 5.7      | 3.8    | 67            | 5.7         | 4.7 | 83     | 4.3            | 2.9      | 69 | 3.4      | 2.6           | 78 | 6    |
| 7.....  | 7.2      | 3.4 | 48            | 8.5         | 5.4 | 64     | 7.6            | 3.9      | 51 | 5.0      | 3.7           | 75       | 6.5      | 2.2    | 35            | 9.3         | 5.1 | 55     | 6.0            | 2.0      | 34 | 3.6      | 2.0           | 56 | 7    |
| 8.....  | 7.6      | 4.1 | 55            | 9.1         | 5.9 | 65     | 8.2            | 5.0      | 61 | 6.5      | 4.7           | 73       | 6.8      | 3.2    | 48            | 7.4         | 4.2 | 57     | 6.3            | 3.2      | 52 | 4.7      | 2.4           | 51 | 8    |
| 9.....  | 8.3      | 5.5 | 66            | 9.5         | 7.5 | 79     | 8.7            | 6.0      | 70 | 7.4      | 6.2           | 84       | 7.4      | 4.2    | 58            | 7.6         | 5.2 | 69     | 6.8            | 4.2      | 63 | 5.2      | 3.7           | 72 | 9    |
| 10..... | 9.3      | 5.6 | 60            | 10.3        | 7.2 | 70     | 8.3            | 5.1      | 61 | 6.5      | 4.2           | 64       | 7.1      | 3.7    | 52            | 7.4         | 4.9 | 66     | 5.3            | 2.6      | 50 | 4.0      | 2.4           | 60 | 10   |
| 11..... | 8.9      | 5.6 | 63            | 8.4         | 6.3 | 75     | 7.6            | 5.2      | 68 | 6.4      | 4.7           | 73       | 6.9      | 4.8    | 69            | 7.0         | 5.5 | 78     | 5.6            | 4.0      | 72 | 4.9      | 3.9           | 79 | 11   |
| 12..... | 8.1      | 4.6 | 58            | 9.2         | 7.1 | 78     | 8.7            | 6.8      | 79 | 7.4      | 6.3           | 86       | 7.1      | 5.0    | 71            | 7.8         | 5.9 | 76     | 6.8            | 5.4      | 80 | 5.5      | 4.6           | 84 | 12   |
| 13..... | 7.2      | 4.5 | 63            | 8.4         | 6.2 | 74     | 6.5            | 4.5      | 69 | 5.6      | 4.4           | 78       | 6.3      | 3.5    | 56            | 7.3         | 5.1 | 72     | 5.6            | 3.4      | 61 | 4.2      | 2.5           | 59 | 13   |
| 14..... | 7.3      | 5.8 | 80            | 7.2         | 5.5 | 77     | 7.8            | 6.2      | 80 | 5.5      | 4.1           | 76       | 5.6      | 3.9    | 70            | 4.8         | 3.0 | 62     | 4.5            | 2.3      | 53 | 2.3      | 7             | 32 | 14   |
| 15..... | 8.1      | 5.3 | 66            | 9.0         | 6.8 | 76     | 9.4            | 7.3      | 78 | 8.8      | 8.0           | 91       | 7.6      | 5.7    | 76            | 7.4         | 5.5 | 75     | 7.6            | 5.6      | 74 | 7.2      | 5.7           | 80 | 15   |



|            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |              |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|
| 16.....    | 6.4   | 4.4   | 70    | 7.1   | 5.2   | 74    | 5.6   | 3.5   | 63    | 3.5   | 2.0   | 58    | 6.1   | 3.7   | 61    | 6.0   | 3.9   | 65    | 5.1   | 3.0   | 60    | 4.2   | 2.3   | 56    | .....16      |
| 17.....    | 7.1   | 3.8   | 54    | 8.6   | 5.5   | 64    | 7.2   | 3.1   | 43    | 5.8   | 3.7   | 64    | 6.3   | 2.6   | 41    | 6.8   | 4.5   | 66    | 6.7   | 3.4   | 50    | 4.3   | 1.4   | 33    | .....17      |
| 18.....    | 8.9   | 6.1   | 68    | 9.2   | 7.3   | 79    | 8.2   | 6.3   | 77    | 6.8   | 5.7   | 84    | 7.8   | 4.2   | 54    | 8.1   | 5.3   | 66    | 6.9   | 4.0   | 59    | 6.0   | 4.0   | 68    | .....18      |
| 19.....    | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....19      |
| 20.....    | 7.7   | 5.3   | 70    | 9.0   | 8.1   | 90    | 8.3   | 6.7   | 81    | 6.0   | 6.0   | 100   | 6.6   | 4.2   | 64    | 7.6   | 6.0   | 80    | 5.8   | 3.5   | 60    | 3.1   | 2.0   | 65    | .....20      |
| 21.....    | 8.7   | 5.9   | 68    | 10.5  | 9.0   | 86    | 9.5   | 7.4   | 78    | 7.5   | 6.3   | 84    | 7.9   | 5.8   | 74    | 8.9   | 7.7   | 87    | 7.8   | 6.2   | 80    | 5.5   | 4.2   | 75    | .....21      |
| 22.....    | 9.3   | 6.1   | 66    | 10.1  | 8.0   | 80    | 9.2   | 7.3   | 80    | 7.5   | 6.2   | 82    | 8.5   | 5.6   | 66    | 8.5   | 6.8   | 81    | 7.8   | 6.3   | 81    | 6.5   | 5.3   | 83    | .....22      |
| Medians..  | 8.3   | 5.3   | 64    | 8.7   | 6.7   | 77    | 7.5   | 5.1   | 68    | 6.1   | 4.8   | 79    | 7.2   | 4.2   | 59    | 7.5   | 4.3   | 71    | 6.0   | 3.7   | 61    | 5.0   | 3.3   | 65    | .....Medians |
| Iowa.....  | 8.8   | 5.7   | 75    | 9.9   | 8.0   | 89    | 8.8   | 6.6   | 75    | 7.6   | 6.4   | 84    | 8.2   | 5.3   | 64    | 9.0   | 7.0   | 78    | 7.6   | 5.6   | 74    | 6.2   | 5.0   | 81    | .....Iowa    |
| Kansas...  | 8.1   | 5.3   | 65    | 9.1   | 7.4   | 81    | 8.1   | 6.2   | 77    | 6.5   | 5.5   | 84    | 7.0   | 4.3   | 61    | 7.9   | 5.9   | 75    | 7.0   | 4.8   | 69    | 4.9   | 3.3   | 68    | .....Kansas  |
| Courtis... | 9.0   | 9.0   | 100   | 10.0  | 10.0  | 100   | 9.0   | 9.0   | 100   | 8.0   | 8.0   | 100   | 7.0   | 7.0   | 100   | 8.0   | 8.0   | 100   | 7.0   | 7.0   | 100   | 6.0   | 6.0   | 100   | .....Courtis |

TABLE II.—RANKING OF TWENTY-TWO CITIES IN MEDIAN SCORES

| GRADE 8       |      |     |             |      |      |                |      |      |          | GRADE 7 |      |          |      |      |               |      |      |                |      | CITY |          |      |      |               |    |  |  |
|---------------|------|-----|-------------|------|------|----------------|------|------|----------|---------|------|----------|------|------|---------------|------|------|----------------|------|------|----------|------|------|---------------|----|--|--|
| Addition      |      |     | Subtraction |      |      | Multiplication |      |      | Division |         |      | Addition |      |      | Subtraction   |      |      | Multiplication |      |      | Division |      |      |               |    |  |  |
| Attempts      |      |     | Rights      |      |      | Dependability  |      |      | Attempts |         |      | Rights   |      |      | Dependability |      |      | Attempts       |      |      | Rights   |      |      | Dependability |    |  |  |
| Dependability |      |     | Rights      |      |      | Dependability  |      |      | Attempts |         |      | Rights   |      |      | Dependability |      |      | Attempts       |      |      | Rights   |      |      | Dependability |    |  |  |
| Dependability |      |     | Rights      |      |      | Dependability  |      |      | Attempts |         |      | Rights   |      |      | Dependability |      |      | Attempts       |      |      | Rights   |      |      | Dependability |    |  |  |
| 1.....        | 9    | 11  | 13          | 9    | 13.5 | 18             | 14   | 16   | 16       | 18.5    | 17.5 | 6.5      | 7    | 13   | 11            | 10   | 14.5 | 13             | 14   | 12.5 | 17.5     | 19   | 18   | 1             |    |  |  |
| 2.....        | 6.5  | 9   | 15.5        | 3    | 3    | 12             | 2    | 2    | 9        | 1       | 3    | 13       | 4.5  | 6    | 13            | 15   | 17   | 17             | 5.5  | 5    | 7        | 3.5  | 5    | 11            | 2  |  |  |
| 3.....        | 12.5 | 13  | 10          | 17   | 13.5 | 9.5            | 11.5 | 10.5 | 10       | 12      | 11   | 7.5      | 10   | 10   | 9.5           | 13.5 | 10   | 10.5           | 14.5 | 16   | 17       | 14.5 | 13.5 | 16            | 3  |  |  |
| 4.....        | 1    | 1   | 2.5         | 10.5 | 10   | 14             | 15.5 | 19.5 | 17.5     | 10      | 8    | 11       | 1    | 2    | 3             | 12   | 14   | 17             | 11.5 | 18   | 19       | 9    | 8.5  | 4             |    |  |  |
| 5.....        | 21   | 16  | 5           | 21   | 8    | 21             | 8    | 21   | 8        | 20      | 15   | 2        | 20   | 19.5 | 13            | 20   | 19.5 | 7              | 20   | 16   | 6        | 19   | 16   | 8.5           | 5  |  |  |
| 6.....        | 12.5 | 5   | 1           | 12   | 6.5  | 2              | 17   | 5    | 1.5      | 11      | 6    | 5.5      | 21   | 17   | 5             | 18   | 12.5 | 1              | 18   | 12.5 | 1.5      | 10.5 | 8    | 3.5           | 6  |  |  |
| 7.....        | 18   | 20  | 20          | 8    | 11.5 | 16.5           | 9    | 6.5  | 19.5     | 6       | 12   | 21       | 16.5 | 8.5  | 2             | 8    | 6    | 4              | 14.5 | 16   | 17       | 13   | 10   | 3.5           | 7  |  |  |
| 8.....        | 14.5 | 18  | 18          | 15.5 | 20   | 19             | 15.5 | 19.5 | 17.5     | 13.5    | 17.5 | 9        | 15.5 | 20.5 | 2             | 8    | 20.5 | 16.0           | 20.5 | 21   | 8        | 17.5 | 20   | 8             |    |  |  |
| 9.....        | 6.5  | 10  | 13          | 4    | 6.5  | 16.5           | 7    | 8    | 12.5     | 3       | 2    | 9        | 6.5  | 3    | 4             | 4.5  | 4    | 7              | 3    | 4    | 9        | 1    | 2    | 6.5           | 9  |  |  |
| 10.....       |      |     |             |      |      |                |      |      |          |         |      |          |      |      |               |      |      |                |      |      |          |      |      | 10            |    |  |  |
| 11.....       | 3    | 4   | 6           | 13.5 | 11.5 | 11             | 13   | 14   | 12.5     | 15      | 16.5 | 17.5     | 4.5  | 5    | 9.5           | 10   | 17   | 5.5            | 8    | 14.5 | 12       | 12   | 19   | 11            |    |  |  |
| 12.....       | 10   | 7.5 | 8           | 6    | 5    | 9.5            | 6    | 4    | 3        | 5       | 5    | 4        | 11.5 | 11.5 | 13            | 6    | 2    | 2.5            | 4    | 3    | 5        | 3.5  | 3    | 2             |    |  |  |
| 13.....       | 14.5 | 12  | 8           | 18   | 19   | 14             | 10   | 6.5  | 5        | 8       | 9    | 11       | 15   | 15.5 | 18            | 1    | 1    | 10.5           | 10   | 7    | 9        | 10.5 | 13.5 | 17            |    |  |  |
| 14.....       | 16   | 19  | 19          | 15.5 | 9    | 5              | 11.5 | 12   | 11       | 13.5    | 13.5 | 14.5     | 13   | 13.5 | 17            | 16.5 | 16   | 7              | 19   | 12.5 | 1.5      | 20   | 17.5 | 11            |    |  |  |
| 15.....       | 6.5  | 6   | 11          | 7    | 4    | 7              | 8    | 9    | 15       | 9       | 10   | 14.5     | 14   | 8.5  | 6             | 13.5 | 12.5 | 12.5           | 8    | 9.5  | 12.5     | 10.5 | 11   | 14            |    |  |  |
| 16.....       | 18   | 16  | 13          | 19   | 15   | 14             | 20   | 18   | 6.5      | 19      | 16.5 | 5.5      | 19   | 18   | 16            | 19   | 18   | 12.5           | 21   | 20.5 | 14.5     | 21   | 20   | 14            |    |  |  |
| 17.....       | 18   | 21  | 21          | 10.5 | 16.5 | 20             | 4    | 13   | 21       | 17      | 20   | 17.5     | 16.5 | 19.5 | 20.5          | 16.5 | 21   | 20.5           | 11.5 | 19   | 20       | 16   | 21   | 21            |    |  |  |
| 18.....       | 2    | 7.5 | 17          | 5    | 16.5 | 21             | 5    | 10.5 | 19.5     | 4       | 7    | 20       | 8    | 13.5 | 19            | 7    | 15   | 19             | 7    | 11   | 17       | 6    | 6    | 11            |    |  |  |
| 19.....       | 20   | 16  | 8           | 20   | 18   | 2              | 19   | 15   | 4        | 21      | 1    | 7.5      | 18   | 21   | 7             | 21   | 19.5 | 2.5            | 17   | 9.5  | 4        | 17.5 | 15   | 5             |    |  |  |
| 20.....       | 6.5  | 3   | 4           | 1    | 1    | 5              | 1    | 1    | 1.5      | 7       | 4    | 1        | 1    | 1    | 1             | 9.5  | 7    | 7              | 2    | 1    | 3        | 3.5  | 1    | 1             |    |  |  |
| 21.....       | 11   | 14  | 15.5        | 13.5 | 8    | 5              | 18   | 17   | 14       | 18      | 18.5 | 11       | 11.5 | 11.5 | 13            | 4.5  | 3    | 7              | 9    | 6    | 11       | 7    | 7    | 14            |    |  |  |
| 22.....       | 4    | 2   | 2.5         | 2    | 2    | 2              | 3    | 3    | 6.5      | 2       | 1    | 3        | 2    | 4    | 8             | 3    | 5    | 14.5           | 1    | 2    | 9        | 3.5  | 4    | 6.5           | 22 |  |  |

TABLE II.—RANKING OF TWENTY-TWO CITIES IN MEDIAN SCORES—(Continued)

| GRADE 6 |          |       |               |             |       |               |                |       |               | GRADE 5  |       |               |          |       |               |             |       |               |                |       |               |          |       |               |      |
|---------|----------|-------|---------------|-------------|-------|---------------|----------------|-------|---------------|----------|-------|---------------|----------|-------|---------------|-------------|-------|---------------|----------------|-------|---------------|----------|-------|---------------|------|
| CITY    | Addition |       |               | Subtraction |       |               | Multiplication |       |               | Division |       |               | Addition |       |               | Subtraction |       |               | Multiplication |       |               | Division |       |               | CITY |
|         | Rights   |       | Dependability | Attempts    |       | Dependability | Rights         |       | Dependability | Attempts |       | Dependability | Rights   |       | Dependability | Attempts    |       | Dependability | Rights         |       | Dependability | Attempts |       | Dependability |      |
|         | Attempts | 5     | 20.5          | 20.5        | 5     | 5.5           | 9              | 14    | 12            | 13.5     | 12    | 11            | 8.5      | 14.5  | 6.5           | 8           | 11.5  | 11            | 11.5           | 13.5  | 8.5           | 9        | 12    |               |      |
| 1.....  | 13       | 14.5  | 14.5          | 16          | 20    | 18.5          | 16.5           | 18.5  | 19            | 11.5     | 16.5  | 18            | 21       | 20.5  | 18            | 13.5        | 4.5   | 9             | 9.5            | 15.5  | 10            | 17       | 19    |               |      |
| 2.....  | 16       | 17.5  | 17            | 17          | 15.5  | 13.5          | 19             | 17    | 14.5          | 17       | 14.5  | 11            | 17       | 14.5  | 17            | 19          | 18    | 17.5          | 16.5           | 15.5  | 12.5          | 14       | 17    |               |      |
| 3.....  | 1        | 1     | 2             | 12.5        | 10    | 9             | 16.5           | 15    | 14.5          | 10       | 11    | 2             | 5.5      | 11.5  | 5             | 8           | 13    | 4.5           | 7              | 13.5  | 4             | 7        | 9     |               |      |
| 4.....  | 4        | 4     | 4             | 13          | 4     | 13            | 13             | 13    | 17            | 12       | 8     | 18.5          | 14       | 8     | 14            | 13.5        | 10    | 16            | 9.5            | 7     | 12.5          | 10       | 11    |               |      |
| 5.....  | 19       | 11.5  | 5             | 18          | 13    | 4             | 13             | 13    | 17            | 12       | 8     | 18.5          | 14       | 8     | 14            | 13.5        | 10    | 16            | 9.5            | 7     | 12.5          | 10       | 11    |               |      |
| 6.....  | 20.5     | 16    | 9.5           | 21          | 15.5  | 3             | 20             | 16    | 8             | 20       | 13.5  | 18.5          | 12       | 6     | 19            | 16          | 2     | 21            | 18             | 6     | 19            | 11       | 5     |               |      |
| 7.....  | 16       | 20.5  | 20.5          | 12.5        | 19    | 20.5          | 11.5           | 18.5  | 20            | 19       | 18.5  | 15            | 13       | 20    | 20.5          | 1           | 11.5  | 21            | 21             | 18    | 18.5          | 15.5     | 5     |               |      |
| 8.....  | 12       | 17.5  | 18            | 8           | 14    | 18.5          | 8.5            | 11    | 17.5          | 7.5      | 8.5   | 16.5          | 11       | 18    | 18            | 11          | 18    | 20            | 10             | 15    | 18            | 11       | 14    |               |      |
| 9.....  | 8        | 8     | 9.5           | 4           | 4     | 6.5           | 4.5            | 8     | 9             | 4.5      | 4.5   | 5             | 7        | 8.5   | 11.5          | 8.5         | 10    | 11.5          | 6.5            | 5     | 8             | 7        | 8     |               |      |
| 10..... | 2.5      | 6.5   | 14.5          | 2           | 7     | 17            | 6.5            | 10    | 17.5          | 7.5      | 14.5  | 19.5          | 8.5      | 14    | 17            | 11          | 15    | 15            | 17.5           | 19    | 19.5          | 17       | 14    |               |      |
| 11..... | 5        | 6.5   | 12.5          | 14.5        | 11    | 13.5          | 11.5           | 9     | 11            | 9        | 8.5   | 16.5          | 10       | 5.5   | 5             | 15          | 5.5   | 6             | 14.5           | 7     | 5             | 8.5      | 6     |               |      |
| 12..... | 9.5      | 11.5  | 16            | 6.5         | 8     | 9             | 4.5            | 4     | 4             | 4.5      | 2.5   | 3             | 8.5      | 4     | 3             | 6.5         | 4     | 7             | 6.5            | 4     | 2.5           | 5.5      | 3     |               |      |
| 13..... | 16       | 13    | 12.5          | 14.5        | 12    | 15.5          | 18             | 14    | 10            | 15       | 12    | 9             | 14.5     | 16    | 13            | 11.5        | 9     | 14.5          | 13.5           | 9     | 15.5          | 12       | 14    |               |      |
| 14..... | 14       | 5     | 1             | 19          | 17.5  | 11            | 10             | 7     | 2.5           | 17       | 16.5  | 13.5          | 20       | 11    | 4             | 21          | 19    | 20            | 20             | 17    | 21            | 21       | 21    |               |      |
| 15..... | 9.5      | 9.5   | 9.5           | 9.5         | 9     | 12            | 2              | 2.5   | 5.5           | 1        | 1     | 2             | 6        | 2     | 1             | 11          | 5.5   | 8             | 3              | 4     | 1             | 1        | 3     |               |      |
| 16..... | 20.5     | 14.5  | 3.5           | 20          | 21    | 15.5          | 21             | 20    | 16            | 21       | 21    | 21            | 16       | 14    | 10            | 19          | 20    | 17            | 19             | 16.5  | 10.5          | 15.5     | 16    |               |      |
| 17..... | 18       | 19    | 19            | 11          | 17.5  | 20.5          | 15             | 21    | 21            | 13.5     | 18.5  | 19.5          | 14.5     | 19    | 19            | 16          | 17    | 15            | 8              | 13.5  | 19.5          | 14       | 20    |               |      |
| 18..... | 5        | 2.5   | 6.5           | 6.5         | 5.5   | 6.5           | 8.5            | 6     | 7             | 6        | 7     | 5             | 4        | 8.5   | 16            | 4           | 8     | 15            | 4.5            | 7     | 12            | 3        | 5     |               |      |
| 19..... | .....    | ..... | .....         | .....       | ..... | .....         | .....          | ..... | .....         | .....    | ..... | .....         | .....    | ..... | .....         | .....       | ..... | .....         | .....          | ..... | .....         | .....    | ..... |               |      |
| 20..... | 11       | 9.5   | 3.5           | 9.5         | 2     | 1             | 6.5            | 5     | 1             | 11.5     | 6     | 1             | 12       | 8.5   | 9             | 8.5         | 3     | 4.5           | 13             | 11.5  | 10.5          | 20       | 18.5  |               |      |
| 21..... | 7        | 4     | 6.5           | 1           | 1     | 2             | 1              | 1     | 5.5           | 2.5      | 2.5   | 5             | 3        | 1     | 2             | 2           | 1     | 1             | 1.5            | 2     | 2.5           | 5.5      | 4     |               |      |
| 22..... | 2.5      | 2.5   | 9.5           | 3           | 3     | 5             | 3              | 2.5   | 2.5           | 2.5      | 4.5   | 7             | 1        | 3     | 7             | 3           | 2     | 3             | 1.5            | 1     | 1             | 2        | 2     |               |      |

TABLE III.—COMPARISON OF 1914 SCORES IN GRADES 5, 6, AND 7 WITH 1915 SCORES OF GRADES 6, 7, AND 8  
IN NINE CITIES

| CITIES,<br>YEARS,<br>AND<br>GRADES. | GRADE 8       |        |                  |        |                     |        | GRADE 7       |        |                        |        |               |        | GRADE 6          |        |                     |        |               |        | CITY |     |      |      |      |     |      |      |     |
|-------------------------------------|---------------|--------|------------------|--------|---------------------|--------|---------------|--------|------------------------|--------|---------------|--------|------------------|--------|---------------------|--------|---------------|--------|------|-----|------|------|------|-----|------|------|-----|
|                                     | Addi-<br>tion |        | Sub-<br>traction |        | Multi-<br>plication |        | Divi-<br>sion |        | Years<br>and<br>Grades |        | Addi-<br>tion |        | Sub-<br>traction |        | Multi-<br>plication |        | Divi-<br>sion |        |      |     |      |      |      |     |      |      |     |
|                                     |               |        |                  |        |                     |        |               |        |                        |        |               |        |                  |        |                     |        |               |        |      |     |      |      |      |     |      |      |     |
|                                     | Attempts      | Rights | Attempts         | Rights | Attempts            | Rights | Attempts      | Rights | Attempts               | Rights | Attempts      | Rights | Attempts         | Rights | Attempts            | Rights | Attempts      | Rights |      |     |      |      |      |     |      |      |     |
| 3. { '14-5<br>'15-6                 | 5.8           | 2.7    | 6.8              | 3.9    | 5.1                 | 2.5    | 4.0           | 1.5    | '14-6                  | 6.6    | 3.4           | 8.6    | 6.4              | 6.9    | 3.9                 | 4.9    | 4.2           | '14-7  | 7.2  | 3.7 | 9.6  | 8.3  | 8.2  | 5.1 | 7.3  | 5.6  | 3   |
| 4. { '14-5<br>'15-6                 | 7.2           | 4.1    | 7.8              | 5.8    | 6.4                 | 4.0    | 5.5           | 4.2    | '15-7                  | 8.7    | 5.5           | 9.5    | 7.7              | 8.0    | 5.2                 | 7.3    | 6.0           | '15-8  | 8.8  | 5.8 | 10.5 | 8.7  | 10.0 | 7.6 | 9.8  | 8.7  | ... |
| 5. { '14-5<br>'15-6                 | 5.5           | 3.4    | 6.4              | 4.2    | 5.5                 | 3.6    | 4.0           | 3.2    | '14-6                  | 6.2    | 4.2           | 7.5    | 5.7              | 6.8    | 4.8                 | 6.4    | 6.0           | '14-7  | 6.8  | 4.7 | 7.6  | 6.7  | 6.9  | 5.6 | 6.4  | 6.0  | ... |
| 6. { '14-5<br>'15-6                 | 6.7           | 4.6    | 7.5              | 6.0    | 7.5                 | 4.8    | 5.5           | 4.4    | '15-7                  | 6.7    | 4.2           | 7.9    | 6.5              | 6.7    | 5.2                 | 6.6    | 5.6           | '15-8  | 7.5  | 5.4 | 8.4  | 7.0  | 7.6  | 6.0 | 8.1  | 7.9  | ... |
| 7. { '14-5<br>'15-6                 | 4.8           | 2.7    | 5.5              | 3.8    | 4.6                 | 2.6    | 3.5           | 1.7    | '14-6                  | 5.9    | 3.9           | 7.6    | 5.4              | 6.1    | 3.7                 | 5.3    | 3.5           | '14-7  | 6.8  | 4.5 | 10.1 | 8.4  | 8.4  | 5.9 | 9.2  | 8.0  | ... |
| 8. { '14-5<br>'15-6                 | 6.4           | 4.2    | 6.9              | 5.8    | 5.8                 | 4.2    | 4.8           | 3.6    | '15-7                  | 6.6    | 4.7           | 8.7    | 7.6              | 7.1    | 5.8                 | 8.1    | 7.2           | '15-8  | 8.8  | 7.3 | 10.9 | 9.4  | 9.4  | 8.4 | 10.1 | 9.5  | ... |
| 9. { '14-5<br>'15-6                 | 7.2           | 3.4    | 8.5              | 5.4    | 7.6                 | 3.9    | 4.5           | 3.0    | '14-6                  | 7.1    | 3.8           | 8.5    | 7.5              | 8.3    | 4.5                 | 5.7    | 4.6           | '14-7  | 8.7  | 4.2 | 10.7 | 7.7  | 7.8  | 5.6 | 7.7  | 5.7  | ... |
| 10. { '14-5<br>'15-6                | 7.5           | 2.9    | 7.8              | 4.8    | 6.9                 | 4.2    | 4.8           | 3.7    | '15-7                  | 7.8    | 5.7           | 10.2   | 8.4              | 8.0    | 5.2                 | 7.7    | 5.0           | '15-8  | 8.5  | 4.9 | 11.5 | 8.9  | 10.4 | 8.3 | 11.0 | 8.3  | ... |
| 11. { '14-5<br>'15-6                | 7.6           | 4.1    | 9.1              | 5.9    | 8.2                 | 5.0    | 6.5           | 4.7    | '14-6                  | 8.9    | 3.9           | 9.9    | 6.4              | 8.0    | 5.3                 | 7.2    | 4.9           | '14-7  | 8.0  | 4.5 | 10.1 | 7.0  | 8.4  | 5.3 | 7.8  | 6.5  | ... |
| 12. { '14-5<br>'15-6                | 8.3           | 5.5    | 9.5              | 7.5    | 8.7                 | 6.0    | 7.4           | 6.2    | '15-7                  | 9.4    | 6.7           | 10.7   | 8.7              | 9.9    | 7.5                 | 9.9    | 8.7           | '15-8  | 10.3 | 6.4 | 12.1 | 9.4  | 11.1 | 8.2 | 12.5 | 11.0 | ... |
| 13. { '14-5<br>'15-6                | 7.6           | 4.9    | 8.7              | 6.3    | 7.9                 | 5.9    | 6.1           | 4.1    | '14-6                  | 8.6    | 5.6           | 10.1   | 8.4              | 9.4    | 7.0                 | 8.8    | 7.3           | '14-7  | 8.2  | 5.1 | 10.2 | 8.1  | 9.5  | 6.6 | 9.7  | 8.6  | ... |
| 14. { '14-5<br>'15-6                | 7.6           | 5.3    | 7.6              | 6.3    | 6.9                 | 5.0    | 5.2           | 3.9    | '14-6                  | 7.9    | 5.2           | 8.5    | 6.8              | 7.5    | 5.4                 | 7.1    | 6.5           | '15-8  | 9.6  | 6.6 | 11.9 | 9.5  | 11.2 | 9.3 | 11.2 | 10.6 | ... |
| 15. { '14-5<br>'15-6                | 8.1           | 5.3    | 9.0              | 6.8    | 9.4                 | 7.3    | 8.8           | 8.0    | '15-7                  | 8.4    | 5.7           | 9.5    | 7.6              | 9.0    | 6.0                 | 8.1    | 6.8           | '15-8  | 10.3 | 6.7 | 11.8 | 10.0 | 10.8 | 7.7 | 10.4 | 8.8  | ... |
| 16. { '14-5<br>'15-6                | 6.0           | 3.6    | 7.8              | 5.4    | 6.2                 | 3.8    | 4.7           | 3.2    | '14-6                  | 7.3    | 4.6           | 9.0    | 6.8              | 7.5    | 5.2                 | 7.7    | 5.9           | '14-7  | 8.2  | 3.7 | 9.9  | 7.1  | 8.6  | 5.1 | 9.1  | 7.5  | ... |
| 17. { '15-6                         | 8.9           | 6.1    | 9.2              | 7.3    | 8.2                 | 6.3    | 6.8           | 5.7    | '15-7                  | 9.3    | 5.1           | 10.4   | 7.4              | 9.1    | 5.9                 | 8.9    | 7.5           | '15-8  | 11.5 | 6.6 | 12.0 | 8.4  | 11.4 | 7.6 | 11.4 | 9.4  | ... |

TABLE IV.—COMPARISON OF 1914 AND 1915 SCORES IN GRADES 5, 6, 7 AND 8

| GRADES<br>AND<br>YEARS. | GRADE 5  |        |                  |        |                     |        | GRADE 6  |        |          |        |                  |        | GRADES<br>AND<br>YEARS. |                     |        |          |        |
|-------------------------|----------|--------|------------------|--------|---------------------|--------|----------|--------|----------|--------|------------------|--------|-------------------------|---------------------|--------|----------|--------|
|                         | Addition |        | Sub-<br>traction |        | Multipli-<br>cation |        | Division |        | Addition |        | Sub-<br>traction |        |                         | Multipli-<br>cation |        | Division |        |
|                         |          |        |                  |        |                     |        |          |        |          |        |                  |        |                         |                     |        |          |        |
|                         | Attempts | Rights | Attempts         | Rights | Attempts            | Rights | Attempts | Rights | Attempts | Rights | Attempts         | Rights |                         | Attempts            | Rights | Attempts | Rights |
| 3.....                  | 5.8      | 2.7    | 6.8              | 3.9    | 5.1                 | 2.5    | 4.0      | 1.5    | 6.6      | 3.4    | 8.6              | 6.4    | 6.9                     | 3.9                 | 4.9    | 4.2      |        |
|                         | 6.0      | 3.3    | 6.4              | 4.0    | 5.3                 | 3.0    | 4.4      | 2.4    | 7.2      | 4.1    | 7.8              | 5.8    | 6.4                     | 4.0                 | 5.5    | 4.2      |        |
| 5.....                  | 5.5      | 3.4    | 6.4              | 4.2    | 5.5                 | 3.6    | 4.0      | 3.2    | 6.2      | 4.2    | 7.5              | 5.7    | 6.8                     | 4.8                 | 6.4    | 6.0      |        |
|                         | 5.7      | 3.7    | 7.1              | 5.0    | 5.4                 | 3.6    | 4.4      | 2.8    | 6.7      | 4.6    | 7.5              | 6.0    | 7.5                     | 4.8                 | 5.5    | 4.4      |        |
| 6.....                  | 4.8      | 2.7    | 5.5              | 3.8    | 4.6                 | 2.6    | 3.5      | 1.7    | 5.9      | 3.9    | 7.6              | 5.4    | 6.1                     | 3.7                 | 5.3    | 3.5      |        |
|                         | 5.7      | 3.8    | 5.7              | 4.7    | 4.3                 | 2.9    | 3.4      | 2.6    | 6.4      | 4.2    | 6.9              | 5.8    | 5.8                     | 4.2                 | 4.8    | 3.6      |        |
| 7.....                  | 6.4      | 2.9    | 7.4              | 5.0    | 7.4                 | 3.9    | 4.5      | 3.0    | 7.1      | 3.8    | 8.5              | 7.5    | 8.3                     | 4.5                 | 5.7    | 4.6      |        |
|                         | 6.5      | 2.2    | 9.3              | 5.1    | 6.0                 | 2.0    | 3.6      | 2.0    | 7.2      | 3.4    | 8.5              | 5.4    | 7.6                     | 3.9                 | 5.0    | 3.7      |        |
| 8.....                  | 7.5      | 2.9    | 7.8              | 4.8    | 6.9                 | 4.2    | 4.8      | 3.7    | 8.9      | 3.9    | 9.9              | 6.4    | 8.0                     | 5.3                 | 7.2    | 4.9      |        |
|                         | 6.8      | 3.2    | 7.4              | 4.2    | 6.3                 | 3.2    | 4.7      | 2.4    | 7.6      | 4.1    | 9.1              | 5.9    | 8.2                     | 5.0                 | 6.5    | 4.7      |        |
| 9.....                  | 6.1      | 3.0    | 6.7              | 3.6    | 5.1                 | 2.7    | 3.7      | 1.9    | 7.7      | 4.6    | 9.8              | 6.2    | 7.4                     | 5.2                 | 6.1    | 4.4      |        |
|                         | 7.4      | 4.2    | 7.6              | 5.2    | 6.8                 | 4.2    | 5.2      | 3.7    | 8.3      | 5.5    | 9.5              | 7.5    | 8.7                     | 6.0                 | 7.4    | 6.2      |        |
| 12.....                 | 7.6      | 4.9    | 8.7              | 6.3    | 7.9                 | 5.9    | 6.1      | 4.1    | 8.6      | 5.6    | 10.1             | 8.4    | 9.4                     | 7.0                 | 8.8    | 7.3      |        |
|                         | 7.1      | 5.0    | 7.8              | 5.9    | 6.8                 | 5.4    | 5.5      | 4.6    | 8.1      | 4.6    | 9.2              | 7.1    | 8.7                     | 6.8                 | 7.4    | 6.3      |        |



TABLE IV.—COMPARISON OF 1914 AND 1915 SCORES IN GRADES 5, 6, 7 AND 8

| GRADES<br>AND<br>YEARS. | GRADE 5  |        |                  |        |                     |        |          |        | GRADE 6  |        |                  |        |                     |        |          |        | GRADES<br>AND<br>YEARS. |
|-------------------------|----------|--------|------------------|--------|---------------------|--------|----------|--------|----------|--------|------------------|--------|---------------------|--------|----------|--------|-------------------------|
|                         | Addition |        | Sub-<br>traction |        | Multipli-<br>cation |        | Division |        | Addition |        | Sub-<br>traction |        | Multipli-<br>cation |        | Division |        |                         |
|                         |          |        |                  |        |                     |        |          |        |          |        |                  |        |                     |        |          |        |                         |
|                         | Attempts | Rights | Attempts         | Rights | Attempts            | Rights | Attempts | Rights | Attempts | Rights | Attempts         | Rights | Attempts            | Rights | Attempts | Rights |                         |
| 15. ....                | 7.6      | 5.3    | 7.6              | 6.3    | 6.9                 | 5.0    | 5.2      | 3.9    | 7.9      | 5.2    | 8.5              | 6.8    | 7.5                 | 5.4    | 7.1      | 6.5    | 15                      |
|                         | 7.6      | 5.7    | 7.4              | 5.5    | 7.6                 | 5.6    | 7.2      | 5.7    | 8.1      | 5.3    | 9.0              | 6.8    | 9.4                 | 7.3    | 8.8      | 8.0    |                         |
| 18. ....                | 6.0      | 3.6    | 7.8              | 5.4    | 6.2                 | 3.8    | 4.7      | 3.2    | 7.3      | 4.6    | 9.0              | 6.8    | 7.5                 | 5.2    | 7.7      | 5.9    | 18                      |
|                         | 7.8      | 4.2    | 8.1              | 5.3    | 6.9                 | 4.0    | 6.0      | 4.0    | 8.9      | 6.1    | 9.2              | 7.3    | 8.2                 | 6.3    | 6.8      | 5.7    |                         |
| Medians. ....           | 6.4      | 3.5    | 7.2              | 4.8    | 6.2                 | 3.8    | 4.5      | 2.9    | 7.4      | 4.4    | 8.8              | 6.6    | 7.5                 | 5.0    | 6.6      | 5.3    | Medians                 |
|                         | 6.7      | 3.9    | 7.4              | 4.8    | 6.2                 | 3.8    | 4.9      | 3.3    | 7.6      | 4.8    | 8.5              | 6.4    | 7.8                 | 5.4    | 6.4      | 5.2    |                         |
| Iowa. ....              | 8.2      | 5.3    | 9.0              | 7.0    | 7.6                 | 5.6    | 6.2      | 5.0    | 8.8      | 5.7    | 9.9              | 8.0    | 8.8                 | 6.6    | 7.6      | 6.4    | Iowa                    |
| Kansas. ....            | 7.0      | 4.3    | 7.9              | 5.9    | 7.0                 | 4.8    | 4.9      | 3.3    | 8.1      | 5.3    | 9.1              | 7.4    | 8.4                 | 6.2    | 6.5      | 5.5    | Kansas                  |

TABLE IV.—COMPARISON OF 1914 AND 1915 SCORES IN GRADES 5, 6, 7, AND 8—(Continued)

| GRADES<br>AND<br>YEARS. | GRADE 7  |        |                  |        |                     |        | GRADE 8  |        |          |        |                  |        | GRADES<br>AND<br>YEARS. |                     |        |          |        |
|-------------------------|----------|--------|------------------|--------|---------------------|--------|----------|--------|----------|--------|------------------|--------|-------------------------|---------------------|--------|----------|--------|
|                         | Addition |        | Sub-<br>traction |        | Multipli-<br>cation |        | Division |        | Addition |        | Sub-<br>traction |        |                         | Multipli-<br>cation |        | Division |        |
|                         | Rights   |        | Attempts         |        | Rights              |        | Attempts |        | Rights   |        | Attempts         |        |                         | Rights              |        | Attempts |        |
|                         | Attempts | Rights | Attempts         | Rights | Attempts            | Rights | Attempts | Rights | Attempts | Rights | Attempts         | Rights |                         | Attempts            | Rights | Attempts | Rights |
| 3.....                  | 1914     | 7.2    | 3.7              | 9.6    | 8.3                 | 8.2    | 5.1      | 7.3    | 5.6      | 7.9    | 4.3              | 10.3   | 7.9                     | 9.9                 | 7.0    | 8.9      | 7.8    |
|                         | 1915     | 8.7    | 5.5              | 9.5    | 7.7                 | 8.0    | 5.2      | 7.3    | 6.0      | 8.8    | 5.8              | 10.5   | 8.7                     | 10.0                | 7.6    | 9.8      | 8.7    |
| 5.....                  | 1914     | 6.8    | 4.7              | 7.6    | 6.7                 | 6.9    | 5.6      | 6.4    | 6.0      | 7.0    | 4.8              | 8.7    | 7.7                     | 7.8                 | 6.6    | 9.2      | 8.5    |
|                         | 1915     | 6.7    | 4.2              | 7.9    | 6.5                 | 6.7    | 5.2      | 6.6    | 5.6      | 7.5    | 5.4              | 8.4    | 7.0                     | 7.6                 | 6.0    | 8.1      | 7.9    |
| 6.....                  | 1914     | 6.8    | 4.5              | 10.1   | 8.4                 | 8.4    | 5.9      | 9.2    | 8.0      | 8.3    | 6.1              | 10.2   | 9.2                     | 10.1                | 7.8    | 10.5     | 8.7    |
|                         | 1915     | 6.6    | 4.7              | 8.7    | 7.6                 | 7.1    | 5.8      | 8.1    | 7.2      | 8.8    | 7.3              | 10.9   | 9.4                     | 9.4                 | 8.4    | 10.1     | 9.5    |
| 7.....                  | 1914     | 8.7    | 4.2              | 10.7   | 7.7                 | 7.8    | 5.6      | 7.7    | 5.7      | 8.2    | 4.7              | 10.3   | 7.8                     | 9.0                 | 6.2    | 10.0     | 8.5    |
|                         | 1915     | 7.8    | 5.7              | 10.2   | 8.4                 | 8.0    | 5.2      | 7.7    | 5.0      | 8.5    | 4.9              | 11.5   | 8.9                     | 10.4                | 8.3    | 11.0     | 8.3    |
| 8.....                  | 1914     | 8.0    | 4.5              | 10.1   | 7.0                 | 8.4    | 5.3      | 7.8    | 6.5      | 9.3    | 4.9              | 11.0   | 8.1                     | 9.9                 | 5.5    | 9.4      | 7.0    |
|                         | 1915     | 9.0    | 4.8              | 11.1   | 7.8                 | 7.7    | 4.2      | 8.5    | 5.5      | 8.7    | 5.3              | 10.6   | 7.9                     | 9.6                 | 6.4    | 9.5      | 8.0    |
| 9.....                  | 1914     | 9.3    | 5.4              | 10.9   | 8.8                 | 9.4    | 4.6      | 10.2   | 7.1      | 9.8    | 5.8              | 12.0   | 8.8                     | 11.4                | 8.5    | 10.4     | 7.9    |
|                         | 1915     | 9.4    | 6.7              | 10.7   | 8.7                 | 9.9    | 7.5      | 9.9    | 8.7      | 10.3   | 6.4              | 12.1   | 9.4                     | 11.1                | 8.2    | 12.5     | 11.0   |
| 12.....                 | 1914     | 8.2    | 5.1              | 10.2   | 8.1                 | 9.5    | 6.6      | 9.7    | 8.6      | 8.9    | 6.9              | 11.6   | 9.6                     | 11.5                | 9.3    | 11.3     | 9.9    |
|                         | 1915     | 8.6    | 5.4              | 10.6   | 8.9                 | 9.7    | 7.7      | 9.0    | 8.6      | 9.6    | 6.6              | 11.9   | 9.5                     | 11.2                | 9.3    | 11.2     | 10.6   |



TABLE V.—MEDIAN OF FIVE CITIES MAKING HIGHEST SCORES, MEDIAN OF GROUP, AND IOWA AND KANSAS SCORES

| CITY    | GRADE 8       |        |               |             |        |               |                |        |               |               |        |               | GRADE 7  |        |               |             |        |               |                |        |               |          |        |               | CITY    |          |        |               |               |  |  |
|---------|---------------|--------|---------------|-------------|--------|---------------|----------------|--------|---------------|---------------|--------|---------------|----------|--------|---------------|-------------|--------|---------------|----------------|--------|---------------|----------|--------|---------------|---------|----------|--------|---------------|---------------|--|--|
|         | Addition      |        |               | Subtraction |        |               | Multiplication |        |               | Division      |        |               | Addition |        |               | Subtraction |        |               | Multiplication |        |               | Division |        |               |         |          |        |               |               |  |  |
|         | Dependability |        |               | Rights      |        |               | Attempts       |        |               | Dependability |        |               | Rights   |        |               | Attempts    |        |               | Dependability  |        |               | Rights   |        |               |         | Attempts |        |               | Dependability |  |  |
|         | Attempts      | Rights | Dependability | Attempts    | Rights | Dependability | Attempts       | Rights | Dependability | Attempts      | Rights | Dependability | Attempts | Rights | Dependability | Attempts    | Rights | Dependability | Attempts       | Rights | Dependability | Attempts | Rights | Dependability |         | Attempts | Rights | Dependability |               |  |  |
| 9       | 10.3          | 6.4    | 64            | 12.1        | 9.4    | 78            | 11.1           | 8.2    | 74            | 12.5          | 11.0   | 88            | 9.4      | 6.7    | 72            | 10.7        | 8.7    | 82            | 9.9            | 7.5    | 76            | 9.9      | 8.7    | 88            | 9       |          |        |               |               |  |  |
| 12      | 9.6           | 6.6    | 69            | 11.9        | 9.5    | 83            | 11.2           | 9.3    | 83            | 11.2          | 10.6   | 95            | 8.6      | 5.4    | 63            | 10.6        | 8.9    | 84            | 9.7            | 7.7    | 80            | 9.0      | 8.6    | 96            | 12      |          |        |               |               |  |  |
| 15      | 10.3          | 6.7    | 65            | 11.8        | 10.0   | 85            | 10.8           | 7.7    | 72            | 10.4          | 8.8    | 85            | 8.4      | 5.7    | 68            | 9.5         | 7.6    | 80            | 9.0            | 6.0    | 68            | 8.1      | 6.8    | 84            | 15      |          |        |               |               |  |  |
| 20      | 10.3          | 7.7    | 75            | 13.0        | 11.2   | 86            | 13.7           | 12.3   | 90            | 10.7          | 10.7   | 100           | 10.0     | 9.0    | 90            | 10.0        | 8.2    | 82            | 10.2           | 8.4    | 82            | 9.0      | 9.0    | 100           | 20      |          |        |               |               |  |  |
| 22      | 10.5          | 8.0    | 77            | 12.6        | 10.9   | 87            | 11.9           | 9.5    | 80            | 12.7          | 12.1   | 96            | 10.3     | 6.6    | 65            | 11.0        | 8.5    | 78            | 11.0           | 8.3    | 76            | 9.0      | 7.9    | 88            | 22      |          |        |               |               |  |  |
| Medians | 10.2          | 7.1    | 70            | 12.3        | 10.2   | 84            | 11.7           | 9.4    | 80            | 11.5          | 10.7   | 93            | 9.3      | 6.7    | 72            | 10.4        | 8.4    | 81            | 10.0           | 7.6    | 76            | 9.0      | 8.2    | 91            | Medians |          |        |               |               |  |  |
| Iowa    | 10.4          | 7.5    | 72            | 12.8        | 11.1   | 87            | 11.6           | 9.6    | 83            | 12.0          | 11.1   | 93            | 9.5      | 6.6    | 69            | 11.1        | 9.2    | 83            | 10.4           | 8.2    | 79            | 9.1      | 8.0    | 88            | Iowa    |          |        |               |               |  |  |
| Kansas  | 9.8           | 6.9    | 70            | 11.5        | 9.9    | 86            | 10.9           | 8.9    | 81            | 10.9          | 10.0   | 91            | 8.7      | 5.8    | 66            | 10.0        | 8.3    | 83            | 9.0            | 7.0    | 77            | 9.3      | 8.1    | 87            | Kansas  |          |        |               |               |  |  |

| CITY    | GRADE 6       |        |               |             |        |               |                |        |               |               |        |               | GRADE 5  |        |               |             |        |               |                |        |               |          |        |               | CITY    |          |        |               |               |  |  |
|---------|---------------|--------|---------------|-------------|--------|---------------|----------------|--------|---------------|---------------|--------|---------------|----------|--------|---------------|-------------|--------|---------------|----------------|--------|---------------|----------|--------|---------------|---------|----------|--------|---------------|---------------|--|--|
|         | Addition      |        |               | Subtraction |        |               | Multiplication |        |               | Division      |        |               | Addition |        |               | Subtraction |        |               | Multiplication |        |               | Division |        |               |         |          |        |               |               |  |  |
|         | Dependability |        |               | Rights      |        |               | Attempts       |        |               | Dependability |        |               | Rights   |        |               | Attempts    |        |               | Dependability  |        |               | Rights   |        |               |         | Attempts |        |               | Dependability |  |  |
|         | Attempts      | Rights | Dependability | Attempts    | Rights | Dependability | Attempts       | Rights | Dependability | Attempts      | Rights | Dependability | Attempts | Rights | Dependability | Attempts    | Rights | Dependability | Attempts       | Rights | Dependability | Attempts | Rights | Dependability |         | Attempts | Rights | Dependability |               |  |  |
| 9       | 8.3           | 5.5    | 66            | 9.5         | 7.5    | 79            | 8.7            | 6.0    | 70            | 7.4           | 6.2    | 84            | 7.4      | 4.2    | 58            | 7.6         | 5.2    | 69            | 6.8            | 4.2    | 63            | 5.2      | 3.7    | 72            | 9       |          |        |               |               |  |  |
| 12      | 8.1           | 4.6    | 58            | 9.2         | 7.1    | 78            | 8.7            | 6.8    | 79            | 7.4           | 6.3    | 86            | 7.1      | 5.0    | 71            | 7.8         | 5.9    | 76            | 6.8            | 5.4    | 80            | 5.5      | 4.6    | 84            | 12      |          |        |               |               |  |  |
| 15      | 8.1           | 5.3    | 66            | 9.0         | 6.8    | 76            | 9.4            | 7.3    | 78            | 8.8           | 8.0    | 91            | 7.6      | 5.7    | 76            | 7.4         | 5.5    | 75            | 7.6            | 5.6    | 74            | 7.2      | 5.7    | 80            | 15      |          |        |               |               |  |  |
| 20      | 7.7           | 5.3    | 70            | 9.0         | 8.1    | 90            | 8.3            | 6.7    | 81            | 6.0           | 6.0    | 100           | 6.6      | 4.2    | 64            | 7.6         | 6.0    | 80            | 5.8            | 3.5    | 60            | 3.1      | 2.0    | 65            | 20      |          |        |               |               |  |  |
| 22      | 9.3           | 6.1    | 66            | 10.1        | 8.0    | 80            | 9.2            | 7.3    | 80            | 7.5           | 6.2    | 82            | 8.5      | 5.6    | 66            | 8.5         | 6.8    | 81            | 7.8            | 6.3    | 81            | 6.5      | 5.3    | 83            | 22      |          |        |               |               |  |  |
| Medians | 8.3           | 5.4    | 65            | 9.4         | 7.6    | 81            | 8.9            | 6.9    | 78            | 7.4           | 6.6    | 89            | 7.4      | 5.0    | 67            | 7.8         | 5.9    | 76            | 7.0            | 5.0    | 72            | 5.5      | 4.2    | 77            | Medians |          |        |               |               |  |  |
| Iowa    | 8.8           | 5.7    | 65            | 9.9         | 8.0    | 81            | 8.8            | 6.7    | 76            | 7.6           | 6.4    | 84            | 8.2      | 5.2    | 63            | 9.0         | 7.0    | 78            | 7.6            | 5.6    | 74            | 6.8      | 5.0    | 79            | Iowa    |          |        |               |               |  |  |
| Kansas  | 8.1           | 5.3    | 65            | 9.1         | 7.4    | 81            | 8.1            | 6.2    | 75            | 6.5           | 5.5    | 84            | 7.0      | 4.3    | 60            | 7.9         | 5.9    | 75            | 7.0            | 4.8    | 68            | 4.9      | 3.3    | 67            | Kansas  |          |        |               |               |  |  |

TABLE VI.—CITY DISTRIBUTION: EIGHTH GRADE

## A. ADDITION ATTEMPTS

| CITY  | SCORE |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       | 0     | 1 | 2 | 3  | 4  | 5  | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |
|       |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
| 1...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 363     | 9.8                    | 16   | 1  |
| 2...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 23      | 10.3                   | 24   | 2  |
| 3...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 49      | 8.8                    | 18   | 3  |
| 4...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 140     | 13.0                   | 25   | 4  |
| 5...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 73      | 7.5                    | 17   | 5  |
| 6...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 53      | 8.8                    | 21   | 6  |
| 7...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 32      | 8.5                    | 14   | 7  |
| 8...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 51      | 8.7                    | 22   | 8  |
| 9...  |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 128     | 10.3                   | 17   | 9  |
| 10... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 123     | 10.7                   | 20   | 10 |
| 11... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 69      | 9.6                    | 13   | 11 |
| 12... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 89      | 8.7                    | 14   | 12 |
| 13... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 16      | 8.6                    | 21   | 13 |
| 14... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 58      | 10.3                   | 19   | 14 |
| 15... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 39      | 8.5                    | 20   | 15 |
| 16... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 23      | 8.5                    | 19   | 16 |
| 17... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 56      | 11.5                   | 21   | 17 |
| 18... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 173     | 7.8                    | 17   | 18 |
| 19... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 10.3                   | 14   | 19 |
| 20... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 61      | 9.                     | 18   | 20 |
| 21... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 25      | 10.5                   | 11   | 21 |
| 22... |       |   |   |    |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       | 25      | 10.5                   | 11   | 22 |
| Total | 1     |   | 1 | 10 | 19 | 69 | 164 | 180 | 284 | 227 | 223 | 133 | 105 | 56 | 73 | 42 | 20 | 18 | 13 | 5  | 7  | 4  | 3  | 1  | 6     | 1664    | 9.5                    | 23   |    |



TABLE VI.—CITY DISTRIBUTION: EIGHTH GRADE—(Continued)

## B. SUBTRACTION ATTEMPTS

| CITY  | SCORE |   |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|---|---|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |   |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1 | 2 | 3 | 4 | 5  | 6  | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |
| 1     |       |   |   |   | 1 |    | 2  | 12  | 35  | 50  | 60  | 62  | 48  | 33  | 18 | 13 | 11 | 8  | 3  |    | 2  | 3  | 1  | 1  |       | 363     | 11.4                   | 14   | 1  |
| 2     |       |   |   |   |   |    |    | 2   |     | 2   | 2   | 3   | 6   | 4   | 1  |    |    |    |    | 1  |    | 2  |    |    |       | 23      | 12.5                   | 11   | 2  |
| 3     |       |   |   |   | 1 |    | 2  | 6   | 4   | 6   | 11  | 9   | 6   | 3   |    |    | 1  |    |    |    |    |    |    |    |       | 49      | 10.5                   | 13   | 3  |
| 4     |       |   |   |   |   |    | 5  | 9   | 13  | 19  | 18  | 11  | 14  | 8   | 2  | 2  | 2  | 5  | 8  | 4  |    | 1  |    |    | 2     | 140     | 11.3                   | 21   | 4  |
| 5     |       |   |   | 1 | 4 | 5  | 7  | 14  | 16  | 7   | 9   | 4   | 3   | 2   | 1  |    |    |    |    |    |    |    |    |    |       | 73      | 8.4                    | 18   | 5  |
| 6     |       |   |   |   |   | 1  | 3  | 2   | 8   | 3   | 11  | 9   | 5   | 6   | 1  | 1  | 1  | 1  |    | 1  |    |    |    |    |       | 53      | 10.9                   | 16   | 6  |
| 7     |       |   |   |   | 7 |    |    | 2   | 2   | 5   | 2   | 10  | 3   | 4   | 1  | 1  | 2  |    |    |    |    |    |    |    |       | 32      | 11.5                   | 14   | 7  |
| 8     |       |   |   |   |   |    | 1  | 6   | 5   | 9   | 8   | 7   | 5   | 4   | 2  |    |    |    | 1  | 1  |    |    |    |    |       | 51      | 10.6                   | 16   | 8  |
| 9     |       |   |   |   |   |    | 1  | 5   | 8   | 9   | 23  | 17  | 17  | 12  | 10 | 5  | 6  | 9  | 2  | 1  | 1  | 1  | 1  | 1  |       | 128     | 12.1                   | 17   | 9  |
| 10    |       |   |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |       |         |                        |      | 10 |
| 11    |       |   |   |   |   |    | 2  | 5   | 17  | 16  | 22  | 15  | 7   | 11  | 5  | 7  | 5  |    | 3  | 2  |    | 1  |    |    |       | 123     | 10.8                   | 18   | 11 |
| 12    |       |   |   |   |   |    | 1  |     | 6   | 11  | 8   | 10  | 9   | 9   | 6  | 3  | 2  | 3  |    |    |    | 1  |    |    |       | 69      | 11.9                   | 16   | 12 |
| 13    |       |   |   |   | 1 |    |    | 7   | 16  | 11  | 22  | 8   | 5   | 4   | 7  | 1  | 1  |    |    |    |    | 2  |    |    |       | 89      | 10.3                   | 20   | 13 |
| 14    |       |   |   |   |   |    | 1  | 2   |     | 2   | 5   | 2   |     |     | 1  | 1  |    |    | 2  |    |    |    |    |    |       | 16      | 10.6                   | 12   | 14 |
| 15    |       |   |   |   |   |    |    | 1   | 2   | 5   | 7   | 10  | 5   | 8   | 9  | 1  | 5  | 3  | 1  |    | 1  |    |    |    |       | 58      | 11.8                   | 16   | 15 |
| 16    |       |   |   |   |   |    |    | 7   | 5   | 3   | 9   | 3   | 3   | 1   | 1  | 1  | 1  |    |    |    |    | 1  |    | 1  |       | 39      | 10.2                   | 20   | 16 |
| 17    |       |   |   |   |   |    |    | 2   | 5   | 2   | 2   | 3   | 3   | 4   | 1  |    |    |    |    |    |    |    |    |    |       | 23      | 11.3                   | 19   | 17 |
| 18    |       |   |   |   |   |    | 1  |     | 8   | 4   | 4   | 11  | 8   | 5   | 5  | 1  | 2  | 4  | 1  | 1  |    | 1  |    |    |       | 56      | 12                     | 16   | 18 |
| 19    |       |   |   | 1 | 1 | 1  | 4  | 19  | 38  | 23  | 30  | 20  | 16  | 8   | 3  | 3  | 1  | 3  | 1  |    |    | 1  |    |    |       | 173     | 9.6                    | 15   | 19 |
| 20    |       |   |   |   |   |    |    | 2   |     | 2   |     | 7   | 1   | 4   |    | 1  | 2  | 1  | 2  |    |    |    |    |    |       | 20      | 13                     | 17   | 20 |
| 21    |       |   |   |   |   |    |    | 3   | 4   | 10  | 6   | 9   | 13  | 5   | 3  | 2  | 3  | 1  | 1  |    |    |    |    |    |       | 61      | 10.8                   | 16   | 21 |
| 22    |       |   |   |   |   |    |    |     |     | 3   | 8   |     |     | 3   | 2  | 4  |    | 1  | 2  | 1  |    | 1  |    |    |       | 25      | 12.6                   | 17   | 22 |
| Total |       |   |   | 2 | 8 | 10 | 41 | 116 | 210 | 194 | 274 | 236 | 172 | 142 | 78 | 48 | 44 | 39 | 24 | 12 | 11 | 7  | 2  | 2  |       | 1664    | 10.9                   |      | 20 |

TABLE VI.—CITY DISTRIBUTION: EIGHTH GRADE—(Continued)

## C. MULTIPLICATION ATTEMPTS

| CITY  | SCORE |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | Total | Medians | Percent of<br>Variability | CITY |    |
|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|---------|---------------------------|------|----|
|       | SCORE |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |         |                           |      |    |
|       | 0     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |       |         |                           |      | 24 |
| 1...  | ...   | 1   | 2   | ... | 12  | 35  | 32  | 48  | 63  | 53  | 46  | 19  | 23  | 16  | 7   | 3   | 2   | ... | 1   | ... | ... | ... | ... | ... | 363   | 9.8     | 18                        | 1    |    |
| 2...  | ...   | ... | ... | ... | ... | ... | ... | 2   | 2   | 3   | 2   | 6   | 4   | ... | 3   | 1   | ... | 1   | 1   | ... | ... | ... | ... | ... | 25    | 12.7    | 15                        | 2    |    |
| 3...  | ...   | ... | ... | 1   | 2   | 3   | 6   | 3   | 10  | 9   | 7   | 4   | 2   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | 49    | 10      | 14                        | 3    |    |
| 4...  | ...   | ... | ... | 4   | 10  | 9   | 11  | 25  | 20  | 21  | 11  | 13  | 8   | 5   | ... | 2   | ... | ... | ... | ... | 1   | ... | ... | ... | 140   | 9.6     | 23                        | 4    |    |
| 5...  | ...   | ... | 3   | 5   | 9   | 12  | 13  | 18  | 4   | 4   | 2   | 3   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 73    | 7.6     | 17                        | 5    |    |
| 6...  | ...   | ... | ... | ... | 3   | 7   | 5   | 7   | 11  | 7   | 4   | 6   | 1   | 1   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | 53    | 9.4     | 18                        | 6    |    |
| 7...  | ...   | ... | ... | ... | 1   | ... | 1   | 3   | 8   | 7   | 5   | 3   | 2   | 1   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | 32    | 10.4    | 12                        | 7    |    |
| 8...  | ...   | ... | 1   | 1   | 1   | 2   | 9   | 7   | 10  | 7   | 4   | 3   | 2   | 3   | ... | ... | 2   | ... | ... | ... | ... | ... | ... | ... | 51    | 9.6     | 17                        | 8    |    |
| 9...  | ...   | ... | 2   | ... | 2   | 2   | 1   | 10  | 12  | 17  | 18  | 21  | 14  | 9   | 10  | 5   | ... | 2   | 3   | ... | 1   | ... | 1   | ... | 128   | 11.1    | 17                        | 9    |    |
| 10... | ...   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | ...     | ...                       | ...  | 10 |
| 11... | ...   | ... | ... | 2   | 6   | 12  | 17  | 13  | 14  | 8   | 21  | 2   | 9   | 8   | 5   | 1   | 1   | 1   | 3   | 1   | ... | ... | ... | ... | 123   | 9.9     | 22                        | 11   |    |
| 12... | ...   | ... | 1   | ... | ... | 1   | 4   | 3   | 7   | 15  | 16  | 8   | 6   | 1   | 1   | 4   | 1   | 1   | 1   | ... | ... | ... | ... | ... | 69    | 11.2    | 12                        | 12   |    |
| 13... | ...   | ... | ... | ... | 3   | 7   | 9   | 10  | 11  | 16  | 9   | 8   | 7   | 2   | 2   | 3   | 1   | ... | ... | 1   | ... | ... | ... | ... | 89    | 10.3    | 22                        | 13   |    |
| 14... | ...   | ... | 1   | ... | 1   | 1   | 1   | 2   | 1   | 2   | 3   | 1   | ... | ... | ... | 2   | ... | ... | ... | ... | ... | ... | ... | ... | 16    | 10      | 20                        | 14   |    |
| 15... | ...   | 1   | ... | ... | 1   | 3   | 3   | 8   | 8   | 6   | 6   | 10  | 4   | 3   | 1   | ... | ... | 1   | 1   | 1   | ... | ... | ... | ... | 57    | 10.8    | 19                        | 15   |    |
| 16... | ...   | ... | ... | 2   | 5   | 6   | 6   | 6   | ... | 4   | 4   | 1   | 3   | ... | ... | ... | 2   | ... | ... | ... | ... | ... | ... | ... | 39    | 8.1     | 28                        | 16   |    |
| 17... | ...   | ... | ... | ... | ... | ... | 1   | 2   | 3   | ... | 1   | 7   | 1   | 2   | 1   | 4   | ... | ... | ... | ... | ... | ... | ... | ... | 22    | 11.6    | 22                        | 17   |    |
| 18... | ...   | ... | ... | ... | 1   | 1   | 3   | 4   | 5   | 12  | 5   | 9   | 11  | 3   | 1   | ... | ... | ... | ... | ... | 1   | ... | ... | ... | 56    | 11.4    | 14                        | 18   |    |
| 19... | ...   | ... | ... | 4   | 7   | 20  | 28  | 37  | 26  | 21  | 15  | 6   | 3   | 1   | 3   | 1   | 1   | 1   | ... | ... | ... | ... | ... | ... | 173   | 8.7     | 16                        | 19   |    |
| 20... | ...   | ... | ... | ... | 1   | ... | ... | ... | 1   | ... | 1   | 2   | 4   | 3   | 2   | 2   | 1   | 1   | 1   | ... | 1   | ... | ... | ... | 20    | 13.7    | 13                        | 20   |    |
| 21... | ...   | 1   | 2   | 1   | 3   | 6   | 11  | 4   | 17  | 10  | 4   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 61    | 9.2     | 16                        | 21   |    |
| 22... | ...   | ... | ... | ... | ... | 1   | ... | 3   | 2   | 1   | 7   | 6   | ... | 2   | ... | ... | 2   | 2   | ... | ... | ... | ... | ... | ... | 26    | 11.9    | 12                        | 22   |    |
| Total | ...   | 3   | 7   | 24  | 68  | 128 | 172 | 218 | 237 | 226 | 201 | 128 | 100 | 60  | 37  | 20  | 15  | 9   | 6   | 3   | 1   | 2   | ... | ... | 1665  | 9.9     | 22                        | 22   |    |

TABLE VI.—CITY DISTRIBUTION: EIGHTH GRADE—(Continued)

## D. DIVISION ATTEMPTS

| CITY   | SCORE |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | Total | Medians | Percent of<br>Variability | CITY  |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|---------------------------|-------|-------|
|        | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    |       |         |                           |       | 24    |
| 1....  | 1     | 1     | 1     | 5     | 10    | 30    | 32    | 35    | 75    | 34    | 39    | 18    | 34    | 22    | 9     | 9     | 6     | 6     | 2     | 1     | ..... | ..... | ..... | ..... | ..... | 363     | 8.9                       | 23    | 1     |
| 2....  | ..... | ..... | ..... | ..... | ..... | ..... | 1     | ..... | 1     | 1     | 2     | ..... | 9     | 1     | 3     | 1     | 2     | 1     | 1     | 2     | ..... | ..... | ..... | ..... | ..... | 25      | 12.9                      | 16    | 2     |
| 3....  | ..... | ..... | 1     | 3     | 5     | 3     | 3     | 7     | 3     | 4     | 6     | 3     | 9     | 3     | 1     | 1     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 49      | 9.8                       | 28    | 3     |
| 4....  | ..... | ..... | ..... | 3     | 7     | 9     | 13    | 23    | 10    | 17    | 10    | 20    | 12    | 1     | 4     | 5     | 2     | 2     | 2     | ..... | ..... | ..... | ..... | ..... | 2     | 140     | 10.3                      | 22    | 4     |
| 5....  | ..... | ..... | ..... | 4     | 4     | 8     | 12    | 8     | 15    | 6     | 5     | 3     | 6     | 1     | ..... | ..... | 1     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73      | 8.1                       | 25    | 5     |
| 6....  | ..... | ..... | ..... | 2     | 2     | 5     | 3     | 5     | 7     | 2     | 9     | 2     | 7     | 3     | 2     | 2     | 1     | 1     | ..... | 1     | ..... | ..... | ..... | ..... | ..... | 140     | 10.3                      | 22    | 4     |
| 7....  | ..... | ..... | ..... | ..... | 3     | ..... | 3     | 2     | 1     | 5     | 2     | 4     | 3     | 2     | 3     | 2     | 2     | 2     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73      | 8.1                       | 25    | 5     |
| 8....  | ..... | ..... | ..... | 1     | 1     | 3     | 4     | 3     | 10    | 8     | 6     | 2     | 6     | 3     | 2     | 3     | 2     | 1     | ..... | 1     | ..... | ..... | ..... | ..... | ..... | 32      | 11                        | 23    | 7     |
| 9....  | ..... | ..... | ..... | ..... | ..... | 4     | 3     | 4     | 14    | 12    | 10    | 8     | 19    | 12    | 11    | 12    | 4     | 2     | 4     | 4     | 1     | ..... | 1     | 2     | 128   | 12.5    | 21                        | 9     | 8     |
| 10.... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....   | .....                     | ..... | 10    |
| 11.... | ..... | ..... | ..... | 3     | 9     | 7     | 10    | 6     | 23    | 13    | 14    | 3     | 9     | 11    | 3     | 1     | 2     | 4     | 4     | ..... | 1     | ..... | ..... | ..... | ..... | 123     | 9.3                       | 30    | 11    |
| 12.... | ..... | ..... | ..... | ..... | ..... | 1     | 4     | 6     | 6     | 5     | 11    | 8     | 8     | 5     | 4     | 6     | 3     | 1     | ..... | 1     | ..... | ..... | ..... | ..... | ..... | 69      | 11.2                      | 21    | 12    |
| 13.... | ..... | ..... | ..... | 1     | ..... | 5     | 7     | 4     | 12    | 9     | 13    | 7     | 10    | 10    | 5     | 2     | 2     | 1     | ..... | 1     | ..... | ..... | ..... | ..... | ..... | 89      | 10.5                      | 22    | 13    |
| 14.... | ..... | ..... | ..... | 2     | 1     | ..... | ..... | 1     | 3     | 2     | ..... | 1     | 1     | ..... | 1     | 2     | 1     | 1     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 16      | 9.5                       | 37    | 14    |
| 15.... | ..... | ..... | ..... | ..... | 1     | 1     | 5     | 4     | 8     | 6     | 9     | 5     | 8     | 6     | 2     | 1     | ..... | 1     | 1     | ..... | ..... | ..... | ..... | ..... | ..... | 58      | 10.4                      | 20    | 15    |
| 16.... | ..... | ..... | ..... | 1     | 3     | 5     | 7     | 2     | 7     | 1     | 2     | 2     | 5     | 1     | ..... | 2     | ..... | ..... | 1     | ..... | 1     | ..... | ..... | ..... | ..... | 39      | 8.3                       | 32    | 16    |
| 17.... | ..... | ..... | ..... | 1     | ..... | ..... | 2     | 1     | 3     | 7     | 3     | 1     | ..... | 2     | ..... | 1     | 1     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 22      | 8.6                       | 14    | 17    |
| 18.... | ..... | ..... | ..... | ..... | ..... | 2     | 4     | 1     | 6     | 5     | 8     | 5     | 9     | 7     | 2     | 3     | ..... | ..... | 1     | ..... | 1     | 1     | ..... | 1     | ..... | 56      | 11.4                      | 18    | 18    |
| 19.... | ..... | ..... | ..... | 6     | 14    | 19    | 27    | 22    | 24    | 14    | 22    | 7     | 13    | 4     | ..... | ..... | 1     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 173     | 7.9                       | 24    | 19    |
| 20.... | ..... | ..... | ..... | ..... | ..... | ..... | 1     | ..... | 6     | ..... | 4     | 1     | ..... | 4     | ..... | ..... | 1     | ..... | 1     | 1     | 1     | ..... | ..... | ..... | ..... | 20      | 10.7                      | 22    | 20    |
| 21.... | ..... | ..... | ..... | 1     | 5     | 8     | 6     | 5     | 10    | 2     | 4     | 6     | 10    | 3     | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 60      | 8.5                       | 32    | 21    |
| 22.... | ..... | ..... | ..... | ..... | ..... | 1     | ..... | ..... | 1     | 3     | 2     | 3     | 4     | 3     | 2     | 3     | 1     | ..... | ..... | 1     | ..... | 2     | ..... | ..... | ..... | 26      | 12.7                      | 18    | 22    |
| Total  | ..... | 1     | 1     | 28    | 59    | 113   | 142   | 131   | 262   | 145   | 186   | 98    | 192   | 113   | 52    | 52    | 33    | 13    | 16    | 13    | 5     | 3     | 1     | 2     | 4     | 1665    | 9.7                       | 33    | ..... |

TABLE VI.—CITY DISTRIBUTION: EIGHTH GRADE—(Continued)  
E. PER CENT OF ACCURACY—ADDITION AND SUBTRACTION

| CITY       | ADDITION             |     |     |     |     |         |                         |    |     |     | SUBTRACTION          |         |     |     |     |     |         |    |      |     | CITY |                         |
|------------|----------------------|-----|-----|-----|-----|---------|-------------------------|----|-----|-----|----------------------|---------|-----|-----|-----|-----|---------|----|------|-----|------|-------------------------|
|            | Per Cent of Accuracy |     |     |     |     |         |                         |    |     |     | Per Cent of Accuracy |         |     |     |     |     |         |    |      |     |      | Per Cent of Variability |
|            | Medians              |     |     |     |     | 0 to 49 | Per Cent of Variability |    |     |     |                      | Medians |     |     |     |     | 0 to 49 |    |      |     |      |                         |
|            | 100                  | 90  | 80  | 70  | 60  |         | 50                      | 49 | Ac. | Rt. | 100                  | 90      | 80  | 70  | 65  | 50  |         | 49 | Ac.  | Rt. |      |                         |
| 1.....     | 16                   | 23  | 42  | 58  | 64  | 54      | 106                     | 64 | 6.2 | 24  | 46                   | 46      | 68  | 74  | 53  | 36  | 40      | 77 | 8.7  | 18  | 1    |                         |
| 2.....     | 1                    | 3   | 1   | 4   | 3   | 4       | 7                       | 63 | 6.5 | 26  | 1                    | 5       | 6   | 4   | 4   | 1   | 2       | 81 | 10.1 | 14  | 2    |                         |
| 3.....     | 7                    | 1   | 6   | 8   | 6   | 9       | 12                      | 67 | 5.8 | 24  | 11                   | 6       | 10  | 8   | 6   | 4   | 4       | 83 | 8.7  | 19  | 3    |                         |
| 4.....     | 7                    | 19  | 36  | 29  | 21  | 15      | 13                      | 77 | 9.0 | 16  | 18                   | 16      | 36  | 27  | 13  | 20  | 10      | 80 | 9.0  | 15  | 4    |                         |
| 5.....     | 10                   | 1   | 14  | 17  | 11  | 11      | 9                       | 73 | 5.4 | 18  | 22                   | 3       | 18  | 11  | 8   | 7   | 4       | 84 | 7.0  | 20  | 5    |                         |
| 6.....     | 8                    | 5   | 18  | 7   | 8   | 4       | 3                       | 83 | 7.3 | 15  | 11                   | 10      | 16  | 8   | 3   | 3   | 2       | 87 | 9.4  | 13  | 6    |                         |
| 7.....     | 1                    | 4   | 3   | 5   | 1   | 9       | 9                       | 58 | 4.9 | 21  | 2                    | 3       | 8   | 8   | 6   | 4   | 1       | 78 | 8.9  | 14  | 7    |                         |
| 8.....     | 2                    | 3   | 6   | 7   | 8   | 7       | 18                      | 61 | 5.3 | 27  | 8                    | 1       | 12  | 9   | 9   | 5   | 7       | 75 | 7.9  | 17  | 8    |                         |
| 9.....     | 6                    | 6   | 15  | 19  | 30  | 20      | 32                      | 64 | 6.4 | 21  | 17                   | 17      | 26  | 22  | 17  | 17  | 12      | 78 | 9.4  | 19  | 9    |                         |
| 10.....    |                      |     |     |     |     |         |                         |    |     |     |                      |         |     |     |     |     |         |    |      |     | 10   |                         |
| 11.....    | 8                    | 14  | 16  | 23  | 17  | 21      | 24                      | 70 | 7.5 | 24  | 24                   | 17      | 25  | 25  | 16  | 6   | 10      | 82 | 8.9  | 17  | 11   |                         |
| 12.....    | 5                    | 5   | 11  | 12  | 10  | 5       | 21                      | 69 | 6.6 | 25  | 16                   | 9       | 13  | 11  | 10  | 7   | 3       | 83 | 9.5  | 19  | 12   |                         |
| 13.....    | 13                   | 5   | 12  | 13  | 17  | 8       | 21                      | 69 | 6.0 | 29  | 19                   | 7       | 22  | 15  | 6   | 12  | 8       | 80 | 8.2  | 25  | 13   |                         |
| 14.....    | 2                    | 1   | 1   | 1   | 3   | 5       | 3                       | 60 | 5.1 | 22  | 5                    | 2       | 3   | 4   | 1   | 1   |         | 86 | 9.1  | 15  | 14   |                         |
| 15.....    | 3                    | 1   | 12  | 7   | 13  | 10      | 12                      | 65 | 6.7 | 22  | 8                    | 14      | 14  | 10  | 4   | 4   | 4       | 85 | 10   | 13  | 15   |                         |
| 16.....    | 8                    |     |     | 3   | 4   | 7       | 6                       | 61 | 5.4 | 27  | 8                    | 3       | 8   | 7   | 2   | 8   | 3       | 80 | 8.6  | 21  | 16   |                         |
| 17.....    |                      |     | 2   | 2   | 3   | 5       | 11                      | 52 | 4.4 | 19  | 1                    | 2       | 5   | 5   | 3   | 2   | 5       | 74 | 8.4  | 19  | 17   |                         |
| 18.....    |                      |     | 7   | 8   | 17  | 7       | 17                      | 62 | 6.6 | 20  | 3                    | 6       | 7   | 12  | 12  | 5   | 11      | 70 | 8.4  | 19  | 18   |                         |
| 19.....    | 26                   | 4   | 32  | 22  | 34  | 28      | 27                      | 69 | 5.4 | 22  | 47                   | 25      | 49  | 28  | 11  | 9   | 4       | 87 | 8.3  | 14  | 19   |                         |
| 20.....    | 4                    | 2   | 2   | 4   | 3   |         | 5                       | 75 | 7.7 | 27  | 4                    | 3       | 9   | 1   | 2   | 1   |         | 86 | 11.2 | 9   | 20   |                         |
| 21.....    | 6                    | 3   | 10  | 3   | 13  | 10      | 16                      | 63 | 5.6 | 27  | 18                   | 4       | 22  | 9   | 4   | 2   | 2       | 86 | 9.2  | 14  | 21   |                         |
| 22.....    | 1                    | 1   | 9   | 4   | 1   | 1       | 8                       | 77 | 8   | 18  | 6                    | 4       | 7   | 4   | 2   | 2   | 0       | 87 | 10.9 | 14  | 22   |                         |
| Total..... | 134                  | 101 | 258 | 257 | 290 | 239     | 385                     | 67 | 6.3 | 80  | 295                  | 203     | 384 | 302 | 192 | 156 | 132     | 82 | 8.9  | 17  |      |                         |





TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE

## A. ADDITION ATTEMPTS

| CITY  | SCORE |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1 | 2 | 3  | 4  | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |
| 1     |       |   | 1 | 1  | 12 | 14  | 50  | 56  | 81  | 97  | 59  | 47  | 32 | 22 | 11 | 10 | 3  | 2  |    | 2  |    |    |    |    |       | 501     | 9.4                    | 17   | 1  |
| 2     |       |   |   |    | 1  | 1   | 2   | 1   | 6   | 3   | 7   | 3   | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 25      | 9.7                    | 13   | 2  |
| 3     |       |   | 1 | 1  | 1  | 5   | 10  | 4   | 11  | 10  | 5   | 3   | 2  | 1  | 1  | 3  | 1  |    |    |    |    |    |    |    |       | 59      | 8.7                    | 21   | 3  |
| 4     |       |   |   |    |    | 4   | 4   | 6   | 14  | 21  | 22  | 17  | 15 | 15 | 7  | 5  | 6  | 2  | 3  |    |    | 1  |    | 1  | 2     | 145     | 11.1                   | 21   | 4  |
| 5     |       | 4 |   | 3  | 4  | 17  | 13  | 14  | 9   | 6   | 4   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 76      | 6.7                    | 20   | 5  |
| 6     | 1     |   |   | 1  | 4  | 12  | 18  | 4   | 6   | 5   | 3   |     | 2  |    | 1  |    |    |    |    |    |    |    |    |    |       | 57      | 6.6                    | 18   | 6  |
| 7     |       |   |   |    | 1  | 2   | 4   | 9   | 3   | 2   | 4   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 27      | 7.8                    | 16   | 7  |
| 8     |       |   |   |    |    |     | 2   | 11  | 9   | 9   | 16  | 7   | 6  | 1  |    | 2  |    |    |    |    |    |    |    |    |       | 63      | 9                      | 17   | 8  |
| 9     |       |   |   |    | 1  | 8   | 15  | 24  | 25  | 33  | 19  | 17  | 11 | 10 | 3  | 1  | 1  | 1  | 1  |    |    |    |    |    |       | 170     | 9.4                    | 18   | 9  |
| 10    |       |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        | 10   |    |
| 11    |       |   |   |    | 2  | 3   | 14  | 16  | 17  | 15  | 8   | 13  | 15 | 8  | 5  | 3  | 2  | 3  |    |    |    |    |    |    |       | 124     | 9.7                    | 24   | 11 |
| 12    |       |   |   |    |    | 14  | 8   | 9   | 14  | 6   | 3   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |       | 56      | 8.6                    | 16   | 12 |
| 13    | 2     |   |   | 1  | 7  | 9   | 18  | 25  | 30  | 6   | 15  | 6   | 3  | 4  |    |    | 1  | 2  |    |    |    | 2  |    |    |       | 131     | 8.1                    | 26   | 13 |
| 14    |       |   |   |    | 2  | 3   | 1   |     | 6   | 3   | 1   |     |    | 2  |    |    |    |    |    |    |    |    |    |    |       | 18      | 8.5                    | 18   | 14 |
| 15    |       |   | 1 |    | 4  | 5   | 11  | 16  | 10  | 15  | 5   | 3   | 3  | 4  | 4  | 1  |    |    |    |    |    |    |    |    |       | 82      | 8.4                    | 18   | 15 |
| 16    |       |   |   | 1  | 1  | 6   | 8   | 6   | 5   | 5   |     |     |    |    |    |    | 1  |    |    |    |    |    |    |    |       | 33      | 7                      | 18   | 16 |
| 17    |       |   |   |    | 2  | 2   | 5   | 6   | 9   | 1   | 1   |     |    |    | 1  |    |    |    |    |    |    |    |    |    |       | 27      | 7.8                    | 14   | 17 |
| 18    |       |   |   |    |    | 5   | 5   | 13  | 16  | 18  | 10  | 7   | 3  | 6  | 1  | 3  |    |    |    | 1  |    |    |    |    |       | 88      | 9.3                    | 16   | 18 |
| 19    |       |   | 2 | 6  | 11 | 15  | 20  | 27  | 21  | 8   | 3   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |       | 114     | 7.1                    | 17   | 19 |
| 20    |       |   |   |    |    |     |     |     |     | 2   | 3   | 3   |    |    |    |    |    |    |    |    |    |    |    |    |       | 13      | 10.0                   | 13   | 20 |
| 21    |       |   |   |    | 1  | 1   | 3   | 8   | 12  | 23  | 12  | 5   | 4  | 4  | 3  | 2  |    |    |    | 1  |    |    |    |    |       | 79      | 8.6                    | 14   | 21 |
| 22    |       |   |   |    |    |     |     |     | 1   | 4   | 2   | 8   | 6  | 7  | 1  | 2  | 1  |    | 1  |    |    |    |    |    |       | 33      | 10.3                   | 12   | 22 |
| Total | 3     |   | 9 | 15 | 54 | 116 | 233 | 261 | 315 | 300 | 193 | 142 | 96 | 76 | 40 | 26 | 16 | 10 | 5  | 4  | 2  | 2  |    | 1  | 2     | 1921    | 8.9                    | 24   |    |

TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE—(Continued)

## B. SUBTRACTION ATTEMPTS

| CITY  | SCORE |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |    |
|-------|-------|---|---|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|----|
|       | 0     | 1 | 2 | 3 | 4  | 5  | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |    |
|       |       |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |    |
| 1...  |       |   |   | 1 | 4  | 14 | 26  | 63  | 79  | 67  | 82  | 59  | 41  | 28 | 12 | 8  | 5  | 3  | 3  | 2  | 1  |    |    |    |       | 1       | 499                    | 9.9  | 17 | 1  |
| 2...  |       |   |   |   |    |    | 1   | 4   | 6   | 5   | 4   | 1   | 3   |    | 1  |    |    |    |    |    |    |    |    |    |       |         | 25                     | 9.4  | 14 | 2  |
| 3...  |       |   |   |   | 2  | 2  | 7   | 3   | 14  | 4   | 11  | 5   | 3   | 2  | 2  | 1  |    | 3  |    |    |    |    |    |    |       |         | 59                     | 9.5  | 17 | 3  |
| 4...  |       |   |   |   | 2  | 3  | 12  | 20  | 23  | 18  | 23  | 10  | 13  | 6  | 4  | 2  | 4  | 2  | 1  |    |    |    | 1  |    |       | 1       | 145                    | 9.7  | 23 | 4  |
| 5...  |       |   | 1 | 1 | 1  | 7  | 13  | 16  | 16  | 11  | 3   | 2   | 3   | 1  | 1  |    |    |    |    |    |    |    |    |    |       |         | 76                     | 7.9  | 16 | 5  |
| 6...  | 2     |   | 1 |   |    | 1  | 6   | 12  | 10  | 11  | 2   | 5   | 4   |    |    |    |    | 2  | 1  |    |    |    |    |    |       |         | 57                     | 8.7  | 15 | 6  |
| 7...  |       |   |   |   |    | 1  | 2   | 3   |     | 7   | 5   | 5   | 1   | 2  |    |    |    |    | 1  |    |    |    |    |    |       |         | 27                     | 10.2 | 12 | 7  |
| 8...  |       |   |   |   |    | 1  | 2   | 2   | 9   | 4   | 13  | 12  | 5   | 6  | 4  |    |    | 2  | 1  | 2  |    |    |    |    |       |         | 63                     | 11.1 | 15 | 8  |
| 9...  |       |   |   |   |    |    | 8   | 23  | 23  | 23  | 31  | 28  | 16  | 9  | 5  | 4  | 6  | 6  | 2  |    | 1  |    |    |    |       |         | 170                    | 10.7 | 15 | 9  |
| 10... |       |   |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    | 10 |
| 11... |       |   |   |   |    | 5  | 5   | 16  | 17  | 19  | 19  | 19  | 6   | 4  | 4  |    | 3  | 2  | 1  | 1  |    |    |    |    |       | 1       | 124                    | 10.  | 17 | 11 |
| 12... |       |   |   |   |    | 1  |     | 2   | 7   | 11  | 11  | 10  | 3   | 6  | 3  | 1  |    | 1  |    |    |    |    |    |    |       |         | 56                     | 10.6 | 12 | 12 |
| 13... | 2     |   |   |   |    | 2  | 3   | 7   | 14  | 20  | 14  | 15  | 11  | 8  | 5  | 6  | 8  | 3  | 1  | 4  | 3  | 2  | 1  | 1  | 1     |         | 131                    | 11.3 | 22 | 13 |
| 14... |       |   |   |   |    | 1  |     | 2   | 3   | 3   | 3   | 1   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |       |         | 18                     | 9.   | 17 | 14 |
| 15... |       |   |   |   |    | 2  | 3   | 8   | 10  | 13  | 11  | 11  | 7   | 4  | 2  |    |    |    |    |    |    |    |    |    |       |         | 82                     | 9.5  | 19 | 15 |
| 16... |       |   |   |   |    | 1  |     | 1   | 8   | 6   | 5   | 5   | 3   |    |    |    |    |    |    |    |    |    |    |    |       |         | 32                     | 8.5  | 15 | 16 |
| 17... |       |   |   |   |    |    | 2   | 5   | 7   | 4   | 5   | 1   |     |    |    | 1  |    | 1  |    |    |    |    |    |    |       |         | 27                     | 9.   | 15 | 17 |
| 18... |       |   |   |   |    |    | 6   | 5   | 12  | 15  | 17  | 12  | 7   | 8  |    | 4  | 1  | 1  |    |    |    |    |    |    |       |         | 88                     | 10.4 | 14 | 18 |
| 19... | 1     |   |   | 2 | 4  | 6  | 21  | 28  | 24  | 15  | 5   | 3   | 1   | 3  | 1  |    |    |    |    |    |    |    |    |    |       |         | 114                    | 7.8  | 15 | 19 |
| 20... |       |   |   |   |    | 2  | 1   | 2   |     |     | 1   | 3   | 1   | 2  |    |    |    |    |    |    |    |    |    |    |       |         | 12                     | 10.  | 20 | 20 |
| 21... |       |   |   |   |    |    | 1   | 1   | 4   | 15  | 9   | 14  | 14  | 8  | 5  | 3  | 1  |    | 1  |    |    |    |    | 1  |       |         | 79                     | 10.7 | 15 | 21 |
| 22... |       |   |   |   |    |    |     |     |     |     | 5   | 5   | 2   | 3  | 4  |    | 1  |    |    |    |    |    |    |    |       |         | 33                     | 11.  | 19 | 22 |
| Total | 5     | 1 | 2 | 5 | 18 | 51 | 127 | 223 | 301 | 268 | 286 | 222 | 137 | 97 | 51 | 30 | 29 | 26 | 12 | 9  | 6  | 4  | 2  | 2  | 3     | 1917    | 9.9                    | 22   |    |    |

TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE—(Continued)

## C. MULTIPLICATION ATTEMPTS

| CITY  | SCORE |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1 | 2 | 3  | 4  | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24    |         |                        |      |    |
| 1.    | 1     |   | 2 | 9  | 16 | 45  | 86  | 77  | 78  | 63  | 51  | 31  | 19 | 7  | 9  | 2  | 2  |    | 1  |    |    |    |    |    |       | 499     | 8.2                    | 21   | 1  |
| 2.    |       |   |   |    |    | 1   | 2   | 1   | 6   | 7   | 5   | 2   | 2  |    |    |    |    |    |    |    |    |    |    |    |       | 26      | 9.4                    | 11   | 2  |
| 3.    |       |   | 1 | 2  | 1  | 8   | 5   | 13  | 5   | 7   | 6   | 5   | 2  | 2  | 1  | 1  |    |    |    |    |    |    |    |    |       | 59      | 8.                     | 24   | 3  |
| 4.    |       | 1 | 1 | 2  | 5  | 18  | 24  | 15  | 25  | 28  | 11  | 7   | 3  | 2  | 3  |    |    |    |    |    |    |    |    |    |       | 145     | 8.3                    | 25   | 4  |
| 5.    |       |   |   | 2  | 8  | 14  | 19  | 11  | 11  | 5   | 3   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 75      | 6.7                    | 19   | 5  |
| 6.    | 1     |   |   | 1  | 4  | 12  | 10  | 7   | 10  | 3   | 2   | 3   | 2  |    |    | 1  | 1  |    |    |    |    |    |    |    |       | 57      | 7.1                    | 23   | 6  |
| 7.    |       |   |   |    | 2  | 3   | 6   | 3   | 4   |     | 2   | 5   |    |    |    | 1  | 1  |    |    |    |    |    |    |    |       | 27      | 8.                     | 30   | 7  |
| 8.    |       |   |   | 1  | 5  | 8   | 10  | 10  | 12  | 5   | 5   | 3   |    | 2  | 1  |    |    |    |    |    |    |    |    |    |       | 62      | 7.7                    | 19   | 8  |
| 9.    |       |   |   |    | 2  | 4   | 9   | 19  | 26  | 28  | 22  | 20  | 19 | 9  | 6  | 2  | 2  | 3  |    |    |    |    |    |    |       | 170     | 9.9                    | 17   | 9  |
| 10.   |       |   |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      | 10 |
| 11.   |       | 1 |   | 2  | 3  | 5   | 12  | 16  | 17  | 16  | 16  | 12  | 9  | 5  | 2  | 4  | 2  | 1  |    | 1  |    |    |    |    |       | 124     | 9.4                    | 20   | 11 |
| 12.   |       |   |   |    | 1  |     | 2   | 6   | 7   | 16  | 7   | 9   | 3  | 2  |    | 1  | 2  |    |    |    |    |    |    |    |       | 56      | 9.7                    | 14   | 12 |
| 13.   |       |   |   | 4  | 5  | 13  | 17  | 17  | 17  | 20  | 19  | 5   | 3  | 4  | 1  | 1  |    |    |    |    |    |    |    |    |       | 126     | 8.4                    | 25   | 13 |
| 14.   |       |   |   |    |    | 3   | 6   | 1   | 1   | 2   | 1   | 3   |    |    | 1  |    |    |    |    |    |    |    |    |    |       | 18      | 7.                     | 24   | 14 |
| 15.   |       |   | 1 | 2  | 3  | 6   | 11  | 8   | 10  | 12  | 7   | 8   | 10 | 2  |    | 2  |    |    |    |    |    |    |    |    |       | 82      | 9.                     | 25   | 15 |
| 16.   | 1     |   | 1 | 3  | 4  | 5   | 5   | 5   | 1   | 3   | 3   |     | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 32      | 6.4                    | 27   | 16 |
| 17.   |       |   |   |    | 2  |     | 3   | 8   | 3   | 4   | 3   | 1   | 2  |    | 1  |    |    |    |    |    |    |    |    |    |       | 27      | 8.3                    | 17   | 17 |
| 18.   |       |   |   |    | 1  | 5   | 8   | 16  | 13  | 10  | 13  | 10  | 3  | 4  | 2  | 2  | 1  |    |    |    |    |    |    |    |       | 88      | 9.1                    | 20   | 18 |
| 19.   |       |   | 2 | 3  | 5  | 14  | 23  | 24  | 17  | 13  | 6   | 6   | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 114     | 7.4                    | 18   | 19 |
| 20.   |       |   |   |    |    |     |     |     | 3   | 2   | 4   | 2   |    | 1  |    |    |    |    |    |    |    |    |    |    |       | 12      | 10.2                   | 10   | 20 |
| 21.   |       |   |   |    | 3  | 3   | 6   | 12  | 19  | 13  | 12  | 3   | 3  | 3  | 1  | 1  | 1  |    |    |    |    |    |    |    |       | 80      | 8.8                    | 15   | 21 |
| 22.   |       |   |   |    |    |     | 1   | 6   | 3   | 2   | 6   | 1   | 9  | 3  | 1  | 1  | 1  | 1  |    |    |    |    |    |    |       | 35      | 11.                    | 17   | 22 |
| Total | 3     | 2 | 8 | 31 | 70 | 167 | 265 | 275 | 288 | 259 | 203 | 137 | 92 | 46 | 30 | 19 | 12 | 5  | 1  | 1  |    |    |    |    |       | 1914    | 8.5                    | 26   |    |

TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE—(Continued)

#### D. DIVISION ATTEMPTS

[illegible]

TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE—(Continued)  
E. PER CENT OF ACCURACY—ADDITION AND SUBTRACTION

| CITY       | ADDITION             |    |     |     |     |         |     |     |                         |     | SUBTRACTION          |     |     |     |     |         |     |     |                         |     | CITY |                         |
|------------|----------------------|----|-----|-----|-----|---------|-----|-----|-------------------------|-----|----------------------|-----|-----|-----|-----|---------|-----|-----|-------------------------|-----|------|-------------------------|
|            | Per Cent of Accuracy |    |     |     |     |         |     |     |                         |     | Per Cent of Accuracy |     |     |     |     |         |     |     |                         |     |      | Per Cent of Variability |
|            | Medians              |    |     |     |     |         |     |     |                         |     | Medians              |     |     |     |     |         |     |     |                         |     |      |                         |
|            | 0 to 49              |    |     |     |     | Ac. Rt. |     |     |                         |     | 0 to 49              |     |     |     |     | Ac. Rt. |     |     |                         |     |      |                         |
| 100        | 90                   | 80 | 70  | 60  | 50  | 49      | Ac. | Rt. | Per Cent of Variability | 100 | 90                   | 80  | 70  | 60  | 50  | 49      | Ac. | Rt. | Per Cent of Variability |     |      |                         |
| 1.....     | 27                   | 14 | 85  | 77  | 70  | 76      | 152 | 63  | 5.9                     | 26  | 82                   | 46  | 102 | 82  | 65  | 54      | 68  | 78  | 7.7                     | 20  | 1    |                         |
| 2.....     | 1                    | 3  | 3   | 3   | 3   | 4       | 8   | 63  | 6.1                     | 30  | 1                    | 4   | 6   | 3   | 3   | 3       | 5   | 77  | 7.2                     | 21  | 2    |                         |
| 3.....     | 3                    | 2  | 6   | 11  | 11  | 9       | 17  | 64  | 5.5                     | 23  | 11                   | 6   | 13  | 6   | 5   | 6       | 12  | 81  | 7.7                     | 22  | 3    |                         |
| 4.....     | 6                    | 11 | 32  | 32  | 19  | 17      | 28  | 73  | 8.1                     | 18  | 17                   | 21  | 28  | 22  | 27  | 14      | 16  | 77  | 7.5                     | 18  | 4    |                         |
| 5.....     | 8                    | 1  | 17  | 6   | 9   | 13      | 22  | 63  | 4.2                     | 29  | 18                   | 4   | 19  | 12  | 8   | 4       | 11  | 82  | 6.5                     | 20  | 5    |                         |
| 6.....     | 3                    | 3  | 16  | 7   | 10  | 8       | 10  | 71  | 4.7                     | 18  | 23                   | 3   | 13  | 7   | 4   | 4       | 3   | 88  | 7.6                     | 19  | 6    |                         |
| 7.....     | 1                    | 2  | 6   | 7   | 1   | 3       | 7   | 74  | 5.7                     | 20  | 5                    | 1   | 10  | 5   | 2   | 3       | 1   | 83  | 8.4                     | 14  | 7    |                         |
| 8.....     | 1                    | 1  | 3   | 10  | 7   | 16      | 25  | 54  | 4.8                     | 19  | 2                    | 5   | 12  | 13  | 6   | 11      | 14  | 71  | 7.8                     | 22  | 8    |                         |
| 9.....     | 14                   | 14 | 29  | 33  | 27  | 20      | 33  | 72  | 6.7                     | 20  | 26                   | 23  | 46  | 23  | 19  | 15      | 18  | 82  | 8.7                     | 16  | 9    |                         |
| 10.....    |                      |    |     |     |     |         |     |     |                         |     |                      |     |     |     |     |         |     |     |                         |     | 10   |                         |
| 11.....    | 8                    | 3  | 15  | 21  | 26  | 16      | 35  | 64  | 6.2                     | 23  | 16                   | 15  | 25  | 19  | 16  | 12      | 21  | 77  | 7.7                     | 21  | 11   |                         |
| 12.....    | 4                    | 1  | 7   | 6   | 14  | 11      | 13  | 63  | 5.4                     | 21  | 8                    | 12  | 14  | 8   | 7   | 4       | 3   | 84  | 8.9                     | 14  | 12   |                         |
| 13.....    | 8                    | 2  | 18  | 20  | 15  | 23      | 45  | 59  | 4.8                     | 20  | 21                   | 9   | 39  | 23  | 21  | 9       | 9   | 81  | 9.1                     | 16  | 13   |                         |
| 14.....    |                      | 1  | 2   | 3   | 3   | 5       | 4   | 60  | 5.1                     | 21  | 2                    | 2   | 6   | 1   | 1   | 2       | 4   | 82  | 7.3                     | 18  | 14   |                         |
| 15.....    | 5                    | 4  | 16  | 14  | 11  | 14      | 18  | 68  | 5.7                     | 23  | 10                   | 11  | 21  | 14  | 11  | 9       | 6   | 80  | 7.6                     | 16  | 15   |                         |
| 16.....    | 6                    |    |     | 4   | 2   | 6       | 6   | 9   | 62                      | 4.3 | 27                   | 6   |     |     | 5   | 2       | 5   | 4   | 80                      | 6.8 | 20   | 16                      |
| 17.....    |                      |    | 3   | 1   | 6   | 5       | 12  | 54  | 4.2                     | 19  |                      |     |     | 7   | 5   | 4       | 4   | 71  | 6.4                     | 15  | 17   |                         |
| 18.....    | 1                    | 1  | 13  | 9   | 13  | 15      | 36  | 55  | 5.1                     | 20  | 10                   | 8   | 14  | 14  | 16  | 16      | 10  | 72  | 7.4                     | 21  | 18   |                         |
| 19.....    | 8                    | 1  | 25  | 17  | 17  | 23      | 23  | 67  | 4.1                     | 22  | 35                   | 5   | 28  | 15  | 11  | 13      | 7   | 84  | 6.5                     | 20  | 19   |                         |
| 20.....    | 4                    | 2  | 3   | 2   | 1   | 1       | 0   | 90  | 9.                      | 13  | 2                    |     | 5   | 4   | 1   |         |     | 82  | 8.2                     | 9   | 20   |                         |
| 21.....    | 4                    | 1  | 12  | 12  | 14  | 14      | 22  | 63  | 5.4                     | 24  | 13                   | 9   | 22  | 16  | 6   | 9       | 4   | 82  | 8.8                     | 15  | 21   |                         |
| 22.....    | 3                    | 1  | 3   | 6   | 6   | 5       | 9   | 65  | 6.6                     | 23  | 6                    | 1   | 8   | 6   | 6   | 2       | 3   | 78  | 8.5                     | 17  | 22   |                         |
| Total..... | 115                  | 68 | 318 | 299 | 289 | 304     | 528 | 64  | 5.7                     | 31  | 314                  | 185 | 448 | 305 | 243 | 199     | 223 | 80  | 7.9                     | 17  |      |                         |



TABLE VII.—CITY DISTRIBUTION: SEVENTH GRADE—(Continued)  
F. PER CENT OF ACCURACY—MULTIPLICATION AND DIVISION

| CITY       | MULTIPLICATION       |    |     |     |     |     |       |         |     |                      | DIVISION                |                      |     |     |     |     |         |     |         |    | CITY |                         |
|------------|----------------------|----|-----|-----|-----|-----|-------|---------|-----|----------------------|-------------------------|----------------------|-----|-----|-----|-----|---------|-----|---------|----|------|-------------------------|
|            | Per Cent of Accuracy |    |     |     |     |     |       | Medians |     |                      | Per Cent of Variability | Per Cent of Accuracy |     |     |     |     |         |     | Medians |    |      | Per Cent of Variability |
|            | Per Cent of Accuracy |    |     |     |     |     |       | Medians |     | Per Cent of Accuracy |                         |                      |     |     |     |     | Medians |     |         |    |      |                         |
|            | 100                  | 90 | 80  | 70  | 60  | 50  | to 49 | Ac.     | Rt. | 100                  |                         | 90                   | 80  | 70  | 60  | 50  | to 49   | Ac  | Rt      |    |      |                         |
| 1.....     | 44                   | 17 | 88  | 85  | 73  | 69  | 123   | 68      | 5.5 | 23                   | 142                     | 15                   | 95  | 60  | 58  | 46  | 85      | 80  | 5.3     | 24 |      |                         |
| 2.....     | 3                    | 3  | 5   | 18  | 1   | 2   | 4     | 77      | 7.2 | 17                   | 3                       | 4                    | 11  | 2   | 2   | 1   | 3       | 85  | 7.6     | 10 |      |                         |
| 3.....     | 4                    | 1  | 6   | 14  | 8   | 9   | 17    | 65      | 5.2 | 22                   | 16                      | 2                    | 16  | 3   | 7   | 6   | 9       | 83  | 6       | 23 |      |                         |
| 4.....     | 9                    | 4  | 17  | 22  | 25  | 26  | 42    | 62      | 5.1 | 31                   | 49                      | 10                   | 32  | 18  | 16  | 7   | 13      | 86  | 7.1     | 22 |      |                         |
| 5.....     | 13                   | 2  | 20  | 9   | 13  | 6   | 12    | 78      | 5.2 | 18                   | 31                      | 1                    | 12  | 6   | 10  | 4   | 11      | 86  | 5.6     | 23 |      |                         |
| 6.....     | 14                   | 1  | 19  | 8   | 10  | 3   | 2     | 83      | 5.8 | 19                   | 22                      | 6                    | 14  | 4   | 6   | 2   | 3       | 90  | 7.2     | 13 |      |                         |
| 7.....     | 2                    | .. | 2   | 8   | 2   | 7   | 6     | 65      | 5.2 | 20                   | 11                      | 2                    | 3   | 2   | 2   | 2   | 4       | 90  | 6.9     | 14 |      |                         |
| 8.....     | 3                    | .. | 8   | 4   | 11  | 11  | 25    | 55      | 4.2 | 20                   | 7                       | 3                    | 11  | 5   | 10  | 11  | 16      | 65  | 5.5     | 26 |      |                         |
| 9.....     | 20                   | 15 | 37  | 33  | 25  | 19  | 21    | 76      | 7.5 | 18                   | 51                      | 27                   | 39  | 15  | 17  | 13  | 8       | 88  | 8.7     | 18 |      |                         |
| 10.....    | ..                   | .. | ..  | ..  | ..  | ..  | ..    | ..      | ..  | ..                   | ..                      | ..                   | ..  | ..  | ..  | ..  | ..      | ..  | ..      | .. |      |                         |
| 11.....    | 8                    | 4  | 21  | 20  | 21  | 14  | 36    | 66      | 6.2 | 24                   | 22                      | 13                   | 25  | 15  | 10  | 17  | 22      | 79  | 6.2     | 24 |      |                         |
| 12.....    | 13                   | 4  | 11  | 18  | 1   | 5   | 4     | 80      | 7.7 | 16                   | 25                      | 8                    | 14  | 5   | 3   | 1   | 0       | 96  | 8.6     | 11 |      |                         |
| 13.....    | 14                   | 7  | 36  | 17  | 20  | 14  | 18    | 76      | 6.4 | 17                   | 32                      | 5                    | 30  | 21  | 13  | 11  | 14      | 82  | 6.0     | 24 |      |                         |
| 14.....    | 4                    | 1  | 6   | ..  | 3   | 1   | 3     | 83      | 5.8 | 22                   | 5                       | 3                    | 2   | 3   | 1   | ..  | 4       | 85  | 5.5     | 20 |      |                         |
| 15.....    | 10                   | 5  | 10  | 13  | 12  | 14  | 18    | 68      | 6   | 23                   | 22                      | 11                   | 11  | 11  | 6   | 8   | 12      | 84  | 6.8     | 21 |      |                         |
| 16.....    | 5                    | .. | 7   | 3   | 3   | 4   | 10    | 66      | 4.2 | 28                   | 11                      | 1                    | 7   | 1   | 3   | 2   | 7       | 84  | 5       | 24 |      |                         |
| 17.....    | ..                   | 2  | 4   | 5   | 2   | 3   | 11    | 60      | 5   | 30                   | 5                       | 3                    | 3   | 1   | 2   | 7   | 10      | 55  | 4       | 20 |      |                         |
| 18.....    | 5                    | 5  | 16  | 11  | 15  | 16  | 20    | 65      | 5.9 | 24                   | 22                      | 11                   | 20  | 11  | 7   | 7   | 10      | 85  | 7.5     | 19 |      |                         |
| 19.....    | 18                   | 2  | 41  | 16  | 13  | 12  | 12    | 81      | 6   | 17                   | 53                      | 1                    | 22  | 8   | 14  | 8   | 8       | 89  | 5.9     | 21 |      |                         |
| 20.....    | 1                    | 2  | 4   | 3   | 1   | ..  | 1     | 82      | 8.4 | 11                   | 7                       | 1                    | 3   | ..  | ..  | ..  | ..      | 100 | 9       | 0  |      |                         |
| 21.....    | 11                   | 2  | 14  | 23  | 9   | 9   | 12    | 75      | 6.6 | 17                   | 17                      | 6                    | 24  | 15  | 7   | 4   | 7       | 84  | 7.4     | 16 |      |                         |
| 22.....    | 6                    | 5  | 4   | 6   | 5   | 4   | 5     | 76      | 8.3 | 24                   | 12                      | 3                    | 10  | 4   | 3   | 3   | 0       | 88  | 7.9     | 18 |      |                         |
| Total..... | 207                  | 82 | 376 | 326 | 273 | 248 | 402   | 71      | 6.0 | 21                   | 565                     | 136                  | 404 | 210 | 197 | 160 | 246     | 84  | 6.5     | 24 |      |                         |

TABLE VIII.—CITY DISTRIBUTION: SIXTH GRADE

## A. ADDITION ATTEMPTS

| CITY  | SCORE |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | Total | Medians | Percent of Variability | CITY |    |    |
|-------|-------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|------------------------|------|----|----|
|       | 0     | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    | 21    | 22    | 23    |       |         |                        |      | 24 |    |
|       | 1...  | 2... | 3... | 4... | 5... | 6... | 7... | 8... | 9... | 10... | 11... | 12... | 13... | 14... | 15... | 16... | 17... | 18... | 19... | 20... | 21... | 22... | 23... | 24... | 18    | 15      | 12                     | 9    | 6  | 3  |
| 1...  |       |      |      | 2    | 10   | 38   | 76   | 68   | 115  | 98    | 68    | 40    | 23    | 16    | 13    | 7     | 5     | 2     | 1     | 2     |       |       |       | 1     | 1     | 587     | 8.9                    | 18   | 1  | 1  |
| 2...  |       |      |      |      | 2    | 4    | 9    | 7    | 10   | 3     | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 36      | 7.4                    | 15   | 2  |    |
| 3...  |       |      | 2    | 5    | 10   | 5    | 15   | 13   | 16   | 7     | 1     | 3     |       |       |       |       |       |       |       |       |       |       |       |       |       | 77      | 7.2                    | 18   | 3  |    |
| 4...  |       |      |      | 2    | 3    | 6    | 8    | 17   | 29   | 34    | 24    | 21    | 19    | 6     | 8     | 7     | 1     | 4     | 1     | 1     |       | 1     |       |       |       | 192     | 9.9                    | 22   | 4  |    |
| 5...  |       |      | 1    | 3    | 13   | 10   | 12   | 12   | 7    | 4     | 4     | 2     | 2     |       |       |       |       |       |       |       |       |       |       | 1     |       | 71      | 6.7                    | 24   | 5  |    |
| 6...  |       |      |      | 2    | 7    | 18   | 14   | 14   | 4    | 2     | 2     | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       | 65      | 6.4                    | 17   | 6  |    |
| 7...  |       | 1    |      |      | 6    | 5    | 8    | 10   | 6    | 4     | 2     |       |       | 1     |       |       |       |       |       |       |       |       |       |       |       | 43      | 7.2                    | 19   | 7  |    |
| 8...  |       |      |      | 2    | 5    | 5    | 14   | 18   | 13   | 10    | 5     | 1     | 1     | 1     |       |       |       |       | 1     |       |       |       |       |       |       | 76      | 7.6                    | 16   | 8  |    |
| 9...  |       |      |      |      | 5    | 16   | 25   | 35   | 38   | 22    | 20    | 11    | 6     | 2     | 2     | 3     | 2     |       |       |       |       |       |       |       |       | 187     | 8.3                    | 18   | 9  |    |
| 10... |       |      |      |      |      |      | 1    | 5    | 2    | 6     | 3     | 3     | 1     | 2     | 2     |       |       | 1     |       |       |       |       |       |       |       | 32      | 9.3                    | 18   | 10 |    |
| 11... |       |      | 1    |      | 7    | 15   | 19   | 13   | 29   | 25    | 19    | 12    | 6     | 4     | 4     | 2     | 3     |       |       |       |       |       |       |       |       | 159     | 8.9                    | 20   | 11 |    |
| 12... |       |      |      | 1    | 2    | 3    | 16   | 19   | 21   | 13    | 5     | 3     | 2     | 2     |       |       |       |       |       |       |       |       |       |       |       | 87      | 8.1                    | 15   | 12 |    |
| 13... | 5     |      | 1    | 4    | 16   | 13   | 30   | 38   | 18   | 12    | 3     | 2     | 3     |       | 1     |       |       |       |       |       |       |       |       |       |       | 156     | 7.2                    | 18   | 13 |    |
| 14... |       | 1    |      |      | 3    | 2    | 5    | 3    | 4    | 1     | 4     |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 23      | 7.3                    | 21   | 14 |    |
| 15... |       |      |      | 1    | 5    | 7    | 9    | 18   | 4    | 8     | 6     | 2     | 4     | 4     | 1     | 1     | 1     |       | 1     |       |       |       |       |       |       | 82      | 8.1                    | 27   | 15 |    |
| 16... |       |      |      | 4    | 5    | 8    | 12   | 8    | 3    | 2     | 2     |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 44      | 6.4                    | 18   | 16 |    |
| 17... |       |      |      |      | 7    | 2    | 4    | 7    | 1    | 1     | 2     | 2     |       |       | 1     |       |       |       |       |       |       |       |       |       |       | 27      | 7.1                    | 30   | 17 |    |
| 18... |       |      |      | 1    | 3    | 4    | 18   | 12   | 16   | 16    | 13    | 12    | 3     | 2     | 1     |       |       |       | 1     | 1     |       |       |       | 2     |       | 105     | 8.9                    | 20   | 18 |    |
| 19... |       |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |         |                        |      |    | 19 |
| 20... |       |      |      |      | 1    |      | 6    | 4    | 3    | 1     | 4     |       |       |       |       |       |       |       |       |       |       |       |       |       |       | 19      | 7.7                    | 15   | 20 |    |
| 21... |       |      |      |      | 1    | 5    | 6    | 11   | 13   | 11    | 7     | 5     | 4     |       |       | 1     |       | 1     |       |       |       |       |       |       |       | 65      | 8.7                    | 16   | 21 |    |
| 22... |       |      |      |      | 1    | 1    | 2    | 2    | 9    | 3     | 2     | 6     | 1     | 2     |       | 2     | 1     |       |       |       |       |       |       |       |       | 32      | 9.3                    | 19   | 22 |    |
| Total | 5     | 2    | 5    | 27   | 112  | 168  | 333  | 331  | 365  | 283   | 197   | 127   | 75    | 42    | 33    | 23    | 13    | 8     | 5     | 4     |       | 1     | 1     | 1     | 4     | 2165    | 8.3                    | 25   |    |    |

TABLE VIII.—CITY DISTRIBUTION: SIXTH GRADE—(Continued)

## B. SUBTRACTION ATTEMPTS

| CITY    | SCORE |       |   |    |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |       | Total | Medians | Percent of Variability | CITY |    |    |    |
|---------|-------|-------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|-------|-------|---------|------------------------|------|----|----|----|
|         | 0     | 1     | 2 | 3  | 4  | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23    |       |         |                        |      | 24 |    |    |
|         |       |       |   |    |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |       |       |         |                        |      |    |    |    |
| 1.....  |       |       | 1 | 5  | 14 | 25  | 43  | 77  | 95  | 79  | 87  | 67  | 37  | 15 | 10 | 9  | 3  | 5  | 4  | 3  | 2  | 2  |    |       |       | 1       | 586                    | 9.4  | 18 | 1  |    |
| 2.....  |       |       |   |    |    | 1   | 7   | 9   | 14  | 2   | 1   | 1   | 1   |    |    |    |    |    |    |    |    |    |    |       |       |         | 36                     | 8.1  | 11 | 2  |    |
| 3.....  | 1     |       | 2 | 3  | 2  | 8   | 9   | 17  | 12  | 12  | 5   | 3   | 1   | 1  | 1  |    |    |    |    |    |    |    |    |       |       |         | 77                     | 7.8  | 20 | 3  |    |
| 4.....  |       |       |   | 4  | 2  | 10  | 26  | 32  | 41  | 30  | 16  | 8   | 11  | 5  | 6  | 1  |    |    |    |    |    |    |    |       |       |         | 192                    | 8.5  | 16 | 4  |    |
| 5.....  |       |       | 1 | 2  | 7  | 4   | 17  | 9   | 12  | 6   | 6   | 4   |     |    |    |    |    |    |    |    |    | 1  |    |       |       | 1       | 71                     | 7.5  | 19 | 5  |    |
| 6.....  |       |       |   | 1  | 5  | 8   | 21  | 14  | 7   | 2   | 4   | 2   | 1   |    |    |    |    |    |    |    |    |    |    |       |       |         | 65                     | 6.9  | 15 | 6  |    |
| 7.....  |       |       |   |    | 1  |     | 7   | 7   | 11  | 5   | 3   | 4   | 1   | 2  | 1  |    |    |    |    |    |    |    |    |       |       |         | 43                     | 8.5  | 17 | 7  |    |
| 8.....  |       |       |   |    |    |     | 1   | 5   | 18  | 13  | 12  | 8   | 2   | 3  |    |    |    |    |    | 1  |    |    |    |       |       |         | 76                     | 9.1  | 17 | 8  |    |
| 9.....  |       |       |   |    |    | 8   | 18  | 33  | 27  | 16  | 32  | 21  | 15  | 9  | 5  | 1  | 0  | 1  | 0  | 1  |    |    |    |       |       |         | 187                    | 9.5  | 20 | 9  |    |
| 10..... |       |       |   |    |    |     |     | 1   | 4   | 4   | 6   | 4   | 5   | 3  | 2  |    | 2  |    |    | 1  |    |    |    |       |       |         | 32                     | 10.3 | 16 | 10 |    |
| 11..... |       |       |   | 3  | 10 | 7   | 19  | 27  | 36  | 15  | 20  | 12  | 3   | 3  | 1  |    | 1  | 1  |    |    | 1  |    |    |       |       |         | 159                    | 8.4  | 19 | 11 |    |
| 12..... |       |       |   |    | 2  | 9   | 2   | 10  | 18  | 13  | 12  | 9   | 10  | 1  |    |    | 1  |    |    |    |    |    |    |       |       |         | 87                     | 9.2  | 17 | 12 |    |
| 13..... | 2     |       | 1 | 2  | 5  | 11  | 25  | 32  | 26  | 19  | 16  | 9   | 5   | 4  |    |    |    |    |    |    |    |    |    |       |       |         | 157                    | 8.4  | 25 | 13 |    |
| 14..... |       |       |   | 3  | 1  | 4   | 3   | 5   | 4   | 2   | 1   |     |     |    |    |    |    |    |    |    |    |    |    |       |       |         | 23                     | 7.2  | 21 | 14 |    |
| 15..... |       |       |   | 3  | 2  | 4   | 10  | 9   | 13  | 9   | 11  | 5   | 4   | 5  | 2  |    |    | 2  | 1  | 1  | 1  |    |    |       |       |         | 82                     | 9    | 23 | 15 |    |
| 16..... |       |       |   |    | 7  | 5   | 5   | 9   | 7   | 2   | 2   | 3   |     |    |    |    |    |    |    |    |    |    |    |       |       |         | 44                     | 7.1  | 23 | 16 |    |
| 17..... |       |       |   |    |    | 3   | 4   | 4   | 5   | 4   | 4   | 1   | 1   |    |    |    | 1  |    |    |    |    |    |    |       |       |         | 27                     | 8.6  | 19 | 17 |    |
| 18..... |       |       |   |    | 3  | 4   | 6   | 18  | 19  | 18  | 17  | 10  | 4   |    | 1  | 2  | 2  | 1  |    |    |    |    |    |       |       |         | 105                    | 9.2  | 16 | 18 |    |
| 19..... |       |       |   |    |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |       |       |         |                        |      |    | 19 | 19 |
| 20..... |       |       |   |    |    | 1   |     |     | 2   | 7   | 1   | 2   | 5   |    |    |    |    |    |    |    |    |    |    |       |       |         | 19                     | 9    | 17 | 20 |    |
| 21..... |       |       |   |    |    | 1   | 5   | 6   | 7   | 8   | 13  | 10  | 8   | 3  | 4  |    |    |    |    |    |    |    |    |       |       |         | 65                     | 10.5 | 16 | 21 |    |
| 22..... |       |       |   |    |    | 1   |     | 4   | 1   | 7   | 2   | 6   | 3   | 2  | 1  | 3  | 1  |    | 1  |    |    |    |    |       |       |         | 32                     | 10.1 | 20 | 22 |    |
| Total   | 3     | ..... | 5 | 30 | 61 | 116 | 237 | 343 | 385 | 263 | 274 | 190 | 109 | 54 | 36 | 14 | 10 | 11 | 5  | 6  | 5  | 3  | 3  | ..... |       | 2       | 2165                   | 8.7  | 24 |    |    |

TABLE VIII.—CITY DISTRIBUTION: SIXTH GRADE—(Continued)

## C. MULTIPLICATION ATTEMPTS

| CITY    | SCORE |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |    |
|---------|-------|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|----|
|         | 0     | 1 | 2  | 3  | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |    |
| 1.....  |       |   | 5  | 19 | 30  | 82  | 115 | 106 | 77  | 50  | 40  | 30 | 12 | 3  | 8  | 4  | 2  | 1  |    |    |    |    |    |    |       | 1       | 585                    | 7.4  | 20 | 1  |
| 2.....  | 1     |   |    |    | 1   | 8   | 9   | 8   | 2   | 3   | 2   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       |         | 35                     | 6.9  | 16 | 2  |
| 3.....  | 1     |   | 1  | 2  | 7   | 21  | 20  | 10  | 7   | 1   | 4   | 1  | 2  |    |    |    |    |    |    |    |    |    |    |    |       |         | 77                     | 6.4  | 17 | 3  |
| 4.....  | 1     |   | 2  | 10 | 12  | 34  | 38  | 34  | 33  | 9   | 9   | 4  | 4  |    |    |    | 1  | 1  |    |    |    |    |    |    |       |         | 192                    | 6.9  | 19 | 4  |
| 5.....  |       |   | 1  | 3  | 3   | 11  | 6   | 20  | 7   | 6   | 4   | 2  | 3  |    |    | 1  |    |    |    |    |    |    |    |    | 1     |         | 68                     | 7.5  | 21 | 5  |
| 6.....  |       | 1 | 1  | 9  | 7   | 17  | 10  | 7   | 7   | 1   | 2   | 1  | 2  |    |    |    |    |    |    |    |    |    |    |    |       |         | 65                     | 5.8  | 25 | 6  |
| 7.....  |       | 1 |    | 2  | 3   | 5   | 5   | 10  | 8   | 4   | 3   |    | 2  |    |    |    |    |    |    |    |    |    |    |    |       |         | 43                     | 7.6  | 19 | 7  |
| 8.....  |       |   | 8  | 1  | 4   | 2   | 14  | 14  | 13  | 11  | 5   | 3  | 3  | 3  |    | 1  | 1  |    |    | 1  |    |    |    |    |       |         | 76                     | 8.2  | 20 | 8  |
| 9.....  |       |   | 1  |    | 3   | 14  | 29  | 24  | 35  | 27  | 25  | 14 | 8  | 2  | 3  | 2  |    |    |    |    |    |    |    |    |       |         | 187                    | 8.7  | 20 | 9  |
| 10..... |       |   |    |    |     |     | 4   | 8   | 3   | 4   | 5   | 6  |    | 2  |    |    |    |    |    |    |    |    |    |    |       |         | 32                     | 8.3  | 22 | 10 |
| 11..... |       |   | 1  | 6  | 14  | 14  | 28  | 29  | 23  | 16  | 14  | 7  | 4  | 2  |    | 1  |    |    |    |    |    |    |    |    |       |         | 151                    | 7.6  | 20 | 11 |
| 12..... |       |   |    | 1  | 1   | 5   | 9   | 12  | 22  | 13  | 10  | 9  | 2  | 1  | 1  |    |    |    |    |    |    |    |    |    |       |         | 86                     | 8.7  | 15 | 12 |
| 13..... | 1     |   |    | 6  | 16  | 32  | 42  | 20  | 10  | 16  | 8   | 1  | 2  |    |    |    |    |    |    |    |    |    |    |    |       |         | 154                    | 6.5  | 18 | 13 |
| 14..... |       |   |    | 1  |     | 5   | 2   | 5   | 3   | 2   | 1   | 2  | 1  |    | 1  |    |    |    |    |    |    |    |    |    |       |         | 23                     | 7.8  | 23 | 14 |
| 15..... |       |   |    | 1  |     | 8   | 7   | 9   | 11  | 11  | 11  | 5  | 7  | 6  | 3  | 2  |    | 1  |    |    |    |    |    |    |       |         | 82                     | 9.4  | 22 | 15 |
| 16..... |       | 1 | 4  | 8  | 3   | 10  | 9   | 5   | 2   | 1   |     | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       |         | 44                     | 5.6  | 27 | 16 |
| 17..... |       |   |    | 3  |     | 5   | 5   | 6   | 1   | 1   | 2   | 2  |    | 1  | 1  |    |    |    |    |    |    |    |    |    |       |         | 27                     | 7.2  | 25 | 17 |
| 18..... |       |   |    | 1  | 4   | 8   | 17  | 19  | 18  | 13  | 7   | 8  | 5  | 4  |    |    | 1  |    |    |    |    |    |    |    |       |         | 105                    | 8.2  | 20 | 18 |
| 19..... |       |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    | 19 |
| 20..... |       |   |    |    | 1   |     | 6   | 2   | 3   | 4   | 1   | 1  |    | 1  | 1  |    |    |    |    |    |    |    |    |    |       |         | 20                     | 8.3  | 20 | 20 |
| 21..... |       |   |    | 1  | 2   | 4   | 4   | 6   | 10  | 13  | 16  | 3  | 4  | 1  |    | 1  |    |    |    |    |    |    |    |    |       |         | 65                     | 9.5  | 14 | 21 |
| 22..... |       |   |    |    | 1   |     | 4   | 4   | 5   | 5   | 3   | 2  |    | 3  | 3  |    |    |    |    |    |    |    |    |    |       |         | 30                     | 9.2  | 20 | 22 |
| Total   | 4     | 4 | 15 | 74 | 112 | 289 | 387 | 353 | 301 | 212 | 173 | 97 | 61 | 29 | 21 | 12 | 5  | 3  |    | 1  |    |    |    |    |       | 2       | 2155                   | 7.5  |    | 28 |





TABLE VIII.—CITY DISTRIBUTION: SIXTH GRADE—(Continued)  
E. PER CENT OF ACCURACY—ADDITION AND SUBTRACTION

| CITY       | ADDITION             |       |       |       |       |       |         |                         |                      |       |                      |       | SUBTRACTION |         |         |       |       |                         |       |       |       |       |       |    | CITY |
|------------|----------------------|-------|-------|-------|-------|-------|---------|-------------------------|----------------------|-------|----------------------|-------|-------------|---------|---------|-------|-------|-------------------------|-------|-------|-------|-------|-------|----|------|
|            | Per Cent of Accuracy |       |       |       |       |       |         | Per Cent of Variability | Medians              |       | Per Cent of Accuracy |       |             |         |         |       |       | Per Cent of Variability |       |       |       |       |       |    |      |
|            | Medians              |       |       |       |       |       | 0 to 49 |                         | Per Cent of Accuracy |       |                      |       |             |         |         |       |       |                         |       |       |       |       |       |    |      |
|            | 100                  | 90    | 80    | 70    | 60    | 50    |         |                         | Ac.                  | Rt.   | 100                  | 90    | 80          | 70      | 60      | 50    | Ac.   |                         | Rt.   |       |       |       |       |    |      |
| 1.....     | 40                   | 27    | 81    | 77    | 104   | 91    | 167     | 63                      | 5.6                  | 25    | 63                   | 5.6   | 25          | 112     | 46      | 119   | 89    | 79                      | 49    | 92    | 78    | 7.3   | 20    | 1  |      |
| 2.....     | 2                    | 0     | 4     | 4     | 8     | 6     | 12      | 60                      | 4.4                  | 25    | 60                   | 4.4   | 25          | 5.....  | 5.....  | 7     | 3     | 7                       | 5     | 9     | 65    | 5.3   | 26    | 2  |      |
| 3.....     | 4                    | 2     | 7     | 9     | 12    | 14    | 29      | 57                      | 4.1                  | 19    | 57                   | 4.1   | 19          | 12      | 1       | 21    | 8     | 6                       | 6     | 23    | 75    | 5.8   | 28    | 3  |      |
| 4.....     | 15                   | 13    | 27    | 43    | 34    | 23    | 37      | 76                      | 7.5                  | 18    | 76                   | 7.5   | 18          | 28      | 12      | 51    | 29    | 25                      | 21    | 26    | 78    | 6.6   | 26    | 4  |      |
| 5.....     | 16                   | 2     | 6     | 10    | 12    | 9     | 16      | 69                      | 4.6                  | 24    | 69                   | 4.6   | 24          | 16..... | 16..... | 21    | 7     | 9                       | 7     | 11    | 81    | 6.    | 22    | 5  |      |
| 6.....     | 12                   | ..... | 9     | 6     | 13    | 7     | 18      | 66                      | 4.2                  | 27    | 66                   | 4.2   | 27          | 20      | 2       | 20    | 8     | 7                       | 1     | 7     | 85    | 5.8   | 19    | 6  |      |
| 7.....     | 7                    | 1     | 3     | 4     | 5     | 7     | 23      | 48                      | 3.4                  | ..... | 48                   | 3.4   | .....       | 4       | 1       | 9     | 2     | 9                       | 10    | 8     | 64    | 5.4   | 24    | 7  |      |
| 8.....     | 3                    | ..... | 6     | 15    | 6     | 16    | 30      | 55                      | 4.1                  | 20    | 55                   | 4.1   | 20          | 4       | 5       | 10    | 15    | 9                       | 12    | 21    | 65    | 5.9   | 24    | 8  |      |
| 9.....     | 13                   | 5     | 33    | 27    | 40    | 26    | 43      | 66                      | 5.5                  | 23    | 66                   | 5.5   | 23          | 32      | 16      | 43    | 26    | 21                      | 15    | 34    | 79    | 7.5   | 21    | 9  |      |
| 10.....    | 2                    | 1     | 4     | 4     | 5     | 5     | 11      | 60                      | 5.6                  | 27    | 60                   | 5.6   | 27          | 2       | 2       | 8     | 4     | 5                       | 6     | 5     | 70    | 7.2   | 20    | 10 |      |
| 11.....    | 13                   | 6     | 22    | 16    | 33    | 16    | 53      | 63                      | 5.6                  | 27    | 63                   | 5.6   | 27          | 26      | 10      | 31    | 26    | 21                      | 23    | 22    | 75    | 6.3   | 21    | 11 |      |
| 12.....    | 4                    | ..... | 15    | 11    | 8     | 26    | 23      | 58                      | 4.6                  | 19    | 58                   | 4.6   | 19          | 16      | 4       | 21    | 11    | 13                      | 10    | 12    | 78    | 7.1   | 19    | 12 |      |
| 13.....    | 16                   | ..... | 26    | 20    | 23    | 24    | 47      | 63                      | 4.5                  | 32    | 63                   | 4.5   | 32          | 21      | 7       | 31    | 31    | 24                      | 13    | 29    | 74    | 6.2   | 19    | 13 |      |
| 14.....    | 3                    | 3     | 5     | 5     | 4     | 2     | 1       | 80                      | 5.8                  | 18    | 80                   | 5.8   | 18          | 5       | 1       | 3     | 7     | 5                       | 1     | 1     | 77    | 5.5   | 14    | 14 |      |
| 15.....    | 11                   | 2     | 12    | 10    | 16    | 11    | 20      | 66                      | 5.3                  | 25    | 66                   | 5.3   | 25          | 18      | 5       | 14    | 10    | 11                      | 6     | 18    | 76    | 6.8   | 26    | 15 |      |
| 16.....    | 5                    | 1     | 10    | 6     | 8     | 4     | 10      | 70                      | 4.4                  | 20    | 70                   | 4.4   | 20          | 13..... | 13..... | 6     | 5     | 4                       | 7     | 9     | 74    | 5.2   | 34    | 16 |      |
| 17.....    | 1                    | ..... | 3     | 3     | 2     | 7     | 11      | 54                      | 3.8                  | 19    | 54                   | 3.8   | 19          | 4       | .....   | 2     | 4     | 5                       | 4     | 8     | 64    | 5.5   | 25    | 17 |      |
| 18.....    | 10                   | 3     | 20    | 17    | 11    | 15    | 29      | 68                      | 6.1                  | 25    | 68                   | 6.1   | 25          | 16      | 9       | 26    | 19    | 9                       | 7     | 19    | 79    | 7.3   | 19    | 18 |      |
| 19.....    | .....                | ..... | ..... | ..... | ..... | ..... | .....   | .....                   | .....                | ..... | .....                | ..... | .....       | .....   | .....   | ..... | ..... | .....                   | ..... | ..... | ..... | ..... | ..... | 19 |      |
| 20.....    | 2                    | ..... | 4     | 3     | 3     | 2     | 5       | 70                      | 5.3                  | 21    | 70                   | 5.3   | 21          | 6       | 3       | 4     | 2     | 2                       | 2     | 0     | 90    | 8.1   | 13    | 20 |      |
| 21.....    | 9                    | 3     | 12    | 7     | 7     | 8     | 19      | 68                      | 5.9                  | 27    | 68                   | 5.9   | 27          | 17      | 9       | 18    | 7     | 6                       | 7     | 1     | 86    | 9.    | 17    | 21 |      |
| 22.....    | 4                    | ..... | 7     | 3     | 5     | 6     | 7       | 66                      | 6.1                  | 25    | 66                   | 6.1   | 25          | 7       | 1       | 8     | 7     | 4                       | 2     | 3     | 80    | 8.    | 19    | 22 |      |
| Total..... | 186                  | 68    | 316   | 300   | 359   | 325   | 611     | 64                      | 5.3                  | 31    | 64                   | 5.3   | 31          | 384     | 134     | 473   | 320   | 281                     | 214   | 358   | 77    | 6.7   | 30    |    |      |

TABLE VIII.—CITY DISTRIBUTION: SIXTH GRADE—(Continued)  
F. PER CENT OF ACCURACY—MULTIPLICATION AND DIVISION

| CITY       | MULTIPLICATION       |       |       |       |       |       |         |         |       |                          | DIVISION             |       |       |       |       |         |       |         |       |                         | CITY |
|------------|----------------------|-------|-------|-------|-------|-------|---------|---------|-------|--------------------------|----------------------|-------|-------|-------|-------|---------|-------|---------|-------|-------------------------|------|
|            | Per Cent of Accuracy |       |       |       |       |       |         | Medians |       | Per. Cent of Variability | Per Cent of Accuracy |       |       |       |       |         |       | Medians |       | Per Cent of Variability |      |
|            | Per Cent of Accuracy |       |       |       |       |       |         | Medians |       |                          | Per Cent of Accuracy |       |       |       |       |         |       | Medians |       |                         |      |
|            | 100                  | 90    | 80    | 70    | 60    | 50    | 0 to 49 | Ac.     | Rt.   | 100                      | 90                   | 80    | 70    | 60    | 50    | 0 to 49 | Ac.   | Rt.     |       |                         |      |
| 1.....     | 69                   | 11    | 111   | 73    | 84    | 87    | 150     | 67      | 4.9   | 25                       | 140                  | 20    | 111   | 67    | 78    | 60      | 110   | 77      | 4.4   | 25                      | 1    |
| 2.....     | .....                | 1     | 5     | 3     | 7     | 3     | 16      | 56      | 3.9   | 21                       | 7                    | 1     | 5     | 3     | 6     | 2       | 10    | 68      | 4.1   | 28                      | 2    |
| 3.....     | .....                | 1     | 13    | 11    | 14    | 12    | 21      | 64      | 4.    | 24                       | 19                   | ..... | 16    | 11    | 10    | 4       | 17    | 77      | 4.2   | 26                      | 3    |
| 4.....     | 17                   | 1     | 32    | 26    | 34    | 29    | 53      | 64      | 4.4   | 30                       | 41                   | 4     | 43    | 23    | 30    | 21      | 30    | 77      | 4.5   | 26                      | 4    |
| 5.....     | 10                   | 2     | 9     | 7     | 12    | 11    | 17      | 65      | 4.8   | 25                       | 17                   | 3     | 15    | 11    | 3     | 5       | 14    | 81      | 4.4   | 22                      | 5    |
| 6.....     | 15                   | 1     | 7     | 11    | 10    | 4     | 17      | 72      | 4.2   | 35                       | 22                   | 1     | 7     | 5     | 7     | 8       | 15    | 76      | 3.6   | 35                      | 6    |
| 7.....     | 2                    | 1     | 3     | 4     | 5     | 7     | 21      | 51      | 3.9   | 21                       | 12                   | 2     | 5     | 4     | 7     | 6       | 6     | 75      | 3.7   | 28                      | 7    |
| 8.....     | 2                    | ..... | 10    | 11    | 17    | 17    | 19      | 61      | 5.    | 21                       | 11                   | 2     | 15    | 15    | 10    | 8       | 15    | 73      | 4.7   | 20                      | 8    |
| 9.....     | 16                   | 14    | 31    | 32    | 35    | 30    | 29      | 70      | 6.    | 21                       | 49                   | 16    | 44    | 18    | 22    | 12      | 25    | 84      | 6.2   | 20                      | 9    |
| 10.....    | .....                | 5     | 5     | 5     | 7     | 2     | 13      | 61      | 5.1   | 26                       | 3                    | 3     | 2     | 4     | 7     | 5       | 8     | 64      | 4.2   | 23                      | 10   |
| 11.....    | 18                   | 2     | 25    | 28    | 30    | 25    | 31      | 68      | 5.2   | 21                       | 30                   | 9     | 26    | 20    | 23    | 14      | 37    | 73      | 4.7   | 27                      | 11   |
| 12.....    | 15                   | 3     | 23    | 15    | 9     | 11    | 10      | 79      | 6.8   | 18                       | 31                   | 4     | 20    | 9     | 9     | 8       | 5     | 86      | 6.3   | 20                      | 12   |
| 13.....    | 17                   | 2     | 43    | 11    | 20    | 27    | 33      | 69      | 4.5   | 29                       | 52                   | 4     | 17    | 17    | 19    | 17      | 27    | 78      | 4.4   | 37                      | 13   |
| 14.....    | 5                    | 2     | 4     | 4     | 2     | 2     | 4       | 80      | 6.2   | 23                       | 6                    | 1     | 3     | 3     | 2     | .....   | 8     | 76      | 4.1   | 36                      | 14   |
| 15.....    | 12                   | 8     | 18    | 15    | 9     | 7     | 13      | 78      | 7.3   | 19                       | 29                   | 14    | 14    | 7     | 7     | 3       | 8     | 91      | 8.    | 11                      | 15   |
| 16.....    | 9                    | ..... | 5     | 2     | 9     | 6     | 13      | 63      | 3.5   | 30                       | 15                   | ..... | 1     | 2     | 3     | 5       | 18    | 58      | 2     | 22                      | 16   |
| 17.....    | .....                | 2     | 1     | 4     | 4     | 4     | 16      | 43      | 3.1   | .....                    | 4                    | ..... | 3     | 3     | 5     | 4       | 8     | 64      | 3.7   | 27                      | 17   |
| 18.....    | 12                   | 4     | 33    | 11    | 14    | 15    | 16      | 77      | 6.3   | 19                       | 36                   | 4     | 21    | 6     | 14    | 8       | 16    | 84      | 5.7   | 23                      | 18   |
| 19.....    | .....                | ..... | ..... | ..... | ..... | ..... | .....   | .....   | ..... | .....                    | .....                | ..... | ..... | ..... | ..... | .....   | ..... | .....   | ..... | .....                   | 19   |
| 20.....    | 3                    | 2     | 6     | 1     | 1     | 5     | 2       | 81      | 6.7   | 21                       | 10                   | ..... | 2     | 1     | 2     | 3       | 2     | 100     | 6.    | 0                       | 20   |
| 21.....    | 16                   | 7     | 7     | 11    | 9     | 7     | 8       | 78      | 7.4   | 25                       | 23                   | 4     | 7     | 5     | 8     | 4       | 12    | 84      | 6.3   | 24                      | 21   |
| 22.....    | 5                    | 3     | 7     | 3     | 5     | 3     | 4       | 80      | 7.3   | 21                       | 6                    | 4     | 6     | 5     | 4     | 2       | 3     | 82      | 6.2   | 18                      | 22   |
| Total..... | 248                  | 65    | 359   | 285   | 337   | 314   | 506     | 68      | 5.1   | 29                       | 563                  | 96    | 383   | 239   | 276   | 200     | 394   | 79      | 4.8   | 30                      |      |

TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE

## A. ADDITION ATTEMPTS

| CITY  | SCORE |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1 | 2  | 3  | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24    |         |                        |      |    |
| 1...  |       |   | 4  | 16 | 44  | 70  | 151 | 126 | 114 | 93  | 48  | 28 | 23 | 9  | 8  | 4  | 2  | 3  | 1  |    |    |    |    |    |       | 745     | 7.7                    | 19   | 1  |
| 2...  |       |   | 1  | 7  | 5   | 3   | 1   | 1   | 2   |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 4.4                    | 23   | 2  |
| 3...  |       | 1 | 4  | 6  | 13  | 21  | 19  | 13  | 8   | 2   | 1   |    | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 89      | 6.                     | 21   | 3  |
| 4...  |       | 3 | 1  | 4  | 4   | 17  | 31  | 35  | 35  | 28  | 18  | 21 | 2  | 4  | 4  |    | 2  |    |    |    |    |    |    |    |       | 209     | 8.3                    | 25   | 4  |
| 5...  |       |   | 3  | 8  | 13  | 17  | 11  | 8   | 8   | 1   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       | 71      | 5.7                    | 23   | 5  |
| 6...  |       |   | 1  | 5  | 20  | 19  | 16  | 10  | 7   | 1   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 79      | 5.7                    | 20   | 6  |
| 7...  |       |   |    | 2  | 2   | 7   | 9   | 4   | 5   | 2   |     | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       | 32      | 6.5                    | 17   | 7  |
| 8...  | 3     |   | 1  | 3  | 8   | 11  | 12  | 15  | 13  |     | 2   |    |    | 2  |    | 1  |    |    |    |    |    |    |    |    |       | 71      | 6.8                    | 21   | 8  |
| 9...  |       | 1 |    | 5  | 13  | 19  | 46  | 41  | 28  | 19  | 16  | 9  | 2  |    |    |    |    |    |    |    |    |    |    |    |       | 199     | 7.4                    | 18   | 9  |
| 10... |       |   |    | 2  | 4   | 6   | 10  | 8   | 9   | 2   | 1   | 3  |    |    |    |    |    |    |    |    |    |    |    |    |       | 45      | 7.1                    | 18   | 10 |
| 11... |       |   | 2  | 8  | 18  | 29  | 27  | 30  | 14  | 13  | 9   | 3  | 3  | 3  | 1  |    |    |    |    |    |    |    |    |    |       | 160     | 6.9                    | 20   | 11 |
| 12... |       |   |    |    |     | 8   | 11  | 16  | 14  | 11  | 6   | 4  | 3  | 1  |    |    |    |    |    |    |    |    |    |    |       | 74      | 7.1                    | 19   | 12 |
| 13... |       | 1 | 2  | 3  | 19  | 23  | 40  | 21  | 23  | 3   | 4   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       | 140     | 6.3                    | 19   | 13 |
| 14... |       |   | 1  | 2  | 6   | 6   | 6   | 4   | 1   |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 26      | 5.6                    | 20   | 14 |
| 15... |       |   |    |    | 2   | 3   | 5   | 14  | 14  | 13  | 4   | 2  | 3  |    | 1  | 2  |    |    |    |    |    |    |    |    |       | 65      | 7.6                    | 16   | 15 |
| 16... |       |   |    |    | 7   | 6   | 11  | 15  | 3   | 6   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 49      | 6.1                    | 20   | 16 |
| 17... |       |   |    |    | 1   | 4   | 4   | 3   | 5   |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 6.3                    | 24   | 17 |
| 18... |       |   | 1  | 1  | 9   | 12  | 15  | 16  | 16  | 18  | 4   | 4  | 3  | 1  |    |    |    |    |    |    |    |    |    |    |       | 100     | 7.8                    | 21   | 18 |
| 19... |       |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      | 19 |
| 20... |       |   | 3  |    | 2   | 3   | 5   | 4   | 3   | 1   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 21      | 6.6                    | 21   | 20 |
| 21... |       |   |    | 2  | 3   | 15  | 13  | 20  | 18  | 12  | 11  | 5  | 1  | 1  |    |    |    |    |    |    |    |    |    |    |       | 101     | 7.9                    | 19   | 21 |
| 22... |       |   |    |    | 1   | 2   | 8   | 10  | 8   | 9   | 7   | 1  | 1  | 1  |    |    |    | 1  | 1  |    |    |    |    |    |       | 50      | 8.5                    | 16   | 22 |
| Total | 3     | 6 | 24 | 84 | 205 | 311 | 468 | 400 | 347 | 215 | 128 | 82 | 40 | 21 | 14 | 7  | 4  | 4  | 2  |    |    |    |    |    |       | 2366    | 7.2                    | 21   |    |

TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE—(Continued)

### B. SUBTRACTION ATTEMPTS

| CITY  | SCORE |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1 | 2  | 3  | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |
| 1     | 1     | 2 | 9  |    | 44  | 80  | 131 | 111 | 113 | 63  | 74  | 43 | 20 | 14 | 7  | 7  | 3  | 2  | 2  |    |    |    | 1  |    |       | 747     | 7.8                    | 21   | 1  |
| 2     | 1     |   |    | 1  | 3   | 4   | 3   | 3   | 3   | 2   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 6.3                    | 24   | 2  |
| 3     |       | 1 |    | 1  | 5   | 16  | 14  | 16  | 7   | 11  | 9   | 4  | 2  | 1  | 2  |    |    |    |    |    |    |    |    |    |       | 90      | 6.4                    | 28   | 3  |
| 4     |       |   | 1  | 3  | 14  | 18  | 41  | 31  | 39  | 22  | 22  | 5  | 7  | 2  | 1  | 1  | 1  | 2  |    |    |    |    |    |    |       | 209     | 7.9                    | 18   | 4  |
| 5     |       | 1 | 2  | 2  | 7   | 10  | 12  | 15  | 12  |     | 6   | 2  | 2  |    |    |    |    |    |    |    |    |    |    |    |       | 71      | 7.1                    | 20   | 5  |
| 6     |       |   | 1  | 5  | 17  | 21  | 16  | 10  | 5   | 1   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       | 77      | 5.7                    | 20   | 6  |
| 7     |       |   | 1  |    |     | 3   | 1   | 3   | 6   | 6   | 7   | 3  | 1  | 1  |    | 1  | 1  |    |    |    |    |    |    |    |       | 32      | 9.3                    | 14   | 7  |
| 8     |       |   |    | 3  | 5   | 9   | 15  | 13  | 11  | 5   | 4   | 2  |    |    |    |    |    |    |    |    |    |    |    |    |       | 71      | 7.4                    | 19   | 8  |
| 9     |       |   | 1  | 4  | 4   | 28  | 38  | 40  | 34  | 29  | 13  | 3  | 5  |    |    |    |    |    |    |    |    |    |    |    |       | 199     | 7.6                    | 18   | 9  |
| 10    |       |   | 1  | 3  | 1   | 7   | 6   | 14  | 6   | 2   | 3   | 1  | 1  | 1  | 1  |    |    |    |    |    |    |    |    |    |       | 45      | 7.4                    | 17   | 10 |
| 11    |       |   | 2  | 3  | 18  | 23  | 34  | 30  | 31  | 7   | 5   | 6  | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 160     | 7                      | 18   | 11 |
| 12    |       |   |    | 1  | 2   | 12  | 20  | 15  | 20  | 5   | 6   | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 74      | 7.8                    | 16   | 12 |
| 13    |       |   |    | 2  | 5   | 8   | 21  | 26  | 25  | 21  | 6   | 7  | 4  | 6  | 2  | 2  | 1  | 1  | 2  |    |    | 1  |    |    |       | 140     | 7.3                    | 20   | 13 |
| 14    |       |   |    | 3  | 4   | 5   | 5   | 4   |     | 2   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 26      | 4.8                    | 29   | 14 |
| 15    |       |   | 2  | 3  | 4   | 5   | 5   | 4   |     | 2   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 65      | 7.4                    | 18   | 15 |
| 16    |       |   |    | 2  | 4   | 6   | 16  | 12  | 11  | 3   | 4   | 3  | 1  | 1  |    | 2  |    |    |    |    |    |    |    |    |       | 49      | 6                      | 23   | 16 |
| 17    |       | 1 | 4  | 5  | 7   | 8   | 14  | 5   | 2   | 2   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 6.8                    | 19   | 17 |
| 18    |       |   |    |    | 2   | 4   | 4   | 4   | 3   | 1   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 100     | 8.1                    | 17   | 18 |
| 19    |       |   |    | 1  | 7   | 6   | 12  | 21  | 23  | 9   | 14  | 4  | 1  | 1  |    | 1  |    |    |    |    |    |    |    |    |       |         |                        |      | 19 |
| 20    |       |   |    |    |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 21      | 7.6                    | 15   | 20 |
| 21    |       |   | 1  | 2  | 6   | 10  | 7   | 15  | 11  | 20  | 14  | 5  | 5  | 3  | 1  |    | 1  |    |    |    |    |    |    |    |       | 101     | 8.9                    | 20   | 21 |
| 22    |       |   |    |    | 1   | 2   | 3   | 11  | 5   | 6   | 9   | 3  | 1  | 4  |    | 2  |    |    |    |    |    |    |    |    |       | 50      | 8.5                    | 22   | 22 |
| Total | 4     | 7 | 29 | 70 | 173 | 293 | 424 | 382 | 375 | 204 | 190 | 91 | 55 | 29 | 11 | 14 | 6  | 6  | 6  | 2  |    | 1  | 1  |    |       | 2367    | 7.5                    | 28   |    |

TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE—(Continued)

| CITY  | SCORE |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    | Total | Medians | Percent of Variability | CITY |    |
|-------|-------|----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|---------|------------------------|------|----|
|       |       |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      |    |
|       | 0     | 1  | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |       |         |                        |      | 24 |
| 1...  | 4     | 4  | 41  | 60  | 104 | 143 | 128 | 81  | 80  | 39  | 23 | 20 | 5  | 4  | 3  | 2  |    |    |    | 1  |    |    |    |    |       | 742     | 6.1                    | 26   | 1  |
| 2...  |       |    | 1   |     | 2   | 3   | 5   | 2   | 3   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 6.4                    | 20   | 2  |
| 3...  |       |    | 2   | 10  | 18  | 19  | 16  | 7   | 6   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 90      | 5.3                    | 24   | 3  |
| 4...  |       |    | 1   | 5   | 12  | 19  | 25  | 46  | 38  | 24  | 20 | 10 | 5  | 2  | 1  | 1  | 1  |    |    |    |    |    |    |    |       | 209     | 6.9                    | 20   | 4  |
| 5...  |       |    |     | 4   | 11  | 14  | 16  | 10  | 10  | 1   | 4  |    | 1  |    |    |    |    |    |    |    |    |    |    |    |       | 71      | 5.4                    | 25   | 5  |
| 6...  |       |    | 1   | 17  | 18  | 11  | 20  | 6   | 3   | 1   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 78      | 4.3                    | 29   | 6  |
| 7...  |       |    | 1   | 1   | 4   | 2   | 8   | 9   | 4   | 2   | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 32      | 6                      | 18   | 7  |
| 8...  |       |    | 1   | 5   | 6   | 11  | 8   | 18  | 8   | 8   | 2  | 4  |    |    |    |    |    |    |    |    |    |    |    |    |       | 71      | 6.3                    | 25   | 8  |
| 9...  |       |    |     | 3   | 10  | 13  | 23  | 67  | 35  | 23  | 14 | 8  | 2  |    | 1  |    |    |    |    |    |    |    |    |    |       | 199     | 6.8                    | 16   | 9  |
| 10... |       |    | 1   | 6   | 3   | 9   | 13  | 5   | 4   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 45      | 5.3                    | 23   | 10 |
| 11... |       |    | 1   | 9   | 14  | 35  | 34  | 27  | 16  | 11  | 7  | 2  | 1  | 1  | 1  |    |    |    |    |    |    |    |    |    |       | 160     | 5.6                    | 22   | 11 |
| 12... | 1     |    |     |     | 1   | 4   | 16  | 18  | 7   | 12  | 7  | 5  | 2  |    |    |    |    |    |    |    |    |    |    |    |       | 73      | 6.8                    | 20   | 12 |
| 13... | 1     | 1  | 13  | 13  | 24  | 32  | 24  | 15  | 9   | 4   |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |       | 140     | 5.6                    | 23   | 13 |
| 14... |       | 1  | 6   | 3   | 6   | 5   | 3   |     | 1   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 25      | 4.5                    | 31   | 14 |
| 15... |       |    |     |     | 6   | 7   | 4   | 7   | 11  | 9   | 6  | 4  | 5  | 1  | 1  |    |    |    |    |    |    |    |    |    |       | 62      | 7.6                    | 25   | 15 |
| 16... |       |    | 4   | 6   |     | 9   | 14  | 8   | 2   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 49      | 5.1                    | 23   | 16 |
| 17... |       |    |     | 1   | 2   | 5   | 3   | 4   | 4   | 1   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 20      | 6.7                    | 19   | 17 |
| 18... |       |    |     |     | 2   | 9   | 14  | 27  | 12  | 12  | 11 | 8  | 4  |    |    |    |    |    |    |    |    |    |    |    |       | 100     | 6.9                    | 20   | 18 |
| 19... |       |    |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |         |                        |      | 19 |
| 20... |       |    |     |     | 3   | 4   | 5   | 5   | 2   | 2   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       | 21      | 5.8                    | 21   | 20 |
| 21... |       |    | 1   | 2   | 5   | 11  | 15  | 19  | 21  | 9   | 8  | 4  | 3  |    |    |    |    |    |    |    |    |    |    |    |       | 100     | 7.8                    | 18   | 21 |
| 22... |       |    |     |     | 2   | 6   | 14  | 5   | 8   | 7   | 4  | 4  |    | 1  |    |    |    |    |    |    |    |    |    |    |       | 51      | 7.8                    | 19   | 22 |
| Total | 6     | 20 | 128 | 184 | 310 | 425 | 461 | 285 | 239 | 138 | 79 | 49 | 13 | 7  | 6  | 5  |    |    |    | 1  |    |    |    |    |       | 2358    | 6.0                    | 35   |    |



TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE—(Continued)

## D. DIVISION ATTEMPTS

| CITY  | SCORE |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | Total | Medians | Percent of Variability | CITY |     |    |
|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|---------|------------------------|------|-----|----|
|       | SCORE |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |         |                        |      |     |    |
|       | 0     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |       |         |                        |      | 24  |    |
| 1...  | 6     | 25  | 74  | 144 | 138 | 131 | 82  | 40  | 57  | 18  | 12  | 4   | 5   | 3   | ... | 1   | ... | 2   | ... | ... | ... | ... | 1   | ... | ...   | 743     | 4.9                    | 27   | 1   |    |
| 2...  | ...   | 1   | ... | 4   | 6   | 5   | 1   | 1   | ... | 1   | ... | ... | ... | ... | ... | ... | 1   | ... | ... | ... | ... | ... | ... | ... | ...   | 20      | 4.8                    | 20   | 2   |    |
| 3...  | 0     | 5   | 11  | 22  | 18  | 17  | 6   | 3   | 4   | 1   | 3   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 90      | 4.4                    | 29   | 3   |    |
| 4...  | ...   | 3   | 7   | 23  | 36  | 48  | 29  | 21  | 26  | 6   | 7   | ... | 1   | ... | ... | ... | ... | ... | ... | ... | 1   | ... | ... | ... | ...   | 209     | 5.7                    | 25   | 4   |    |
| 5...  | ...   | 3   | 15  | 11  | 17  | 12  | 5   | 3   | 2   | 1   | 1   | ... | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 71      | 4.4                    | 30   | 5   |    |
| 6...  | ...   | 16  | 15  | 22  | 16  | 4   | 1   | 2   | 3   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 79      | 3.4                    | 32   | 6   |    |
| 7...  | 0     | 3   | 8   | 8   | 4   | 3   | 2   | 3   | ... | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 32      | 3.6                    | 32   | 7   |    |
| 8...  | ...   | 2   | 3   | 17  | 20  | 7   | 8   | 8   | 4   | 1   | ... | 1   | ... | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 71      | 4.7                    | 25   | 8   |    |
| 9...  | ...   | 2   | 10  | 30  | 50  | 53  | 21  | 12  | 12  | 1   | 6   | ... | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 199     | 5.2                    | 23   | 9   |    |
| 10... | ...   | 3   | 5   | 15  | 6   | 11  | 2   | 2   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 45      | 4                      | 29   | 10  |    |
| 11... | 1     | 6   | 10  | 27  | 39  | 26  | 23  | 14  | 9   | 1   | 4   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 160     | 4.9                    | 27   | 11  |    |
| 12... | 1     | 1   | 7   | 6   | 13  | 19  | 11  | 4   | 6   | 3   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 73      | 5.5                    | 23   | 12  |    |
| 13... | 1     | 10  | 12  | 41  | 33  | 24  | 11  | 2   | 3   | 2   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 140     | 4.2                    | 26   | 13  |    |
| 14... | 1     | 10  | 6   | 6   | 2   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 26      | 2.3                    | 40   | 14  |    |
| 15... | ...   | 1   | 6   | 2   | 9   | 8   | 4   | 5   | 12  | 5   | 1   | 2   | 1   | 3   | ... | 2   | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 62      | 7.2                    | 32   | 15  |    |
| 16... | 1     | 7   | 9   | 4   | 15  | 7   | 6   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 49      | 4.2                    | 33   | 16  |    |
| 17... | 1     | ... | 2   | 5   | 6   | 4   | 2   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 20      | 4.3                    | 21   | 17  |    |
| 18... | ...   | 1   | 1   | 11  | 18  | 19  | 19  | 10  | 8   | 4   | 5   | 1   | 3   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 100     | 6                      | 27   | 18  |    |
| 19... | ...   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | ...     | ...                    | ...  | ... | 19 |
| 20... | ...   | 1   | 8   | 6   | 3   | ... | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 20      | 3.1                    | 29   | 20  |    |
| 21... | ...   | 2   | 7   | 11  | 23  | 14  | 16  | 12  | 7   | ... | 4   | 2   | 1   | 1   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 100     | 5.5                    | 26   | 21  |    |
| 22... | ...   | ... | ... | 3   | 6   | 10  | 11  | 7   | 4   | ... | 4   | 2   | 2   | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ...   | 49      | 6.5                    | 20   | 22  |    |
| Total | 12    | 102 | 216 | 318 | 478 | 423 | 261 | 150 | 158 | 45  | 49  | 13  | 15  | 8   | 1   | 4   | ... | 2   | ... | ... | 1   | ... | ... | ... | ...   | 2357    | 5.0                    | 42   |     |    |

TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE—(Continued)  
E. PER CENT OF ACCURACY—ADDITION AND SUBTRACTION

| CITY       | ADDITION             |       |                         |       |       |       |       |       |       |       | SUBTRACTION          |       |       |       |       |       |       |       |       |       | CITY |         |                         |
|------------|----------------------|-------|-------------------------|-------|-------|-------|-------|-------|-------|-------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|---------|-------------------------|
|            | Per Cent of Accuracy |       |                         |       |       |       |       |       |       |       | Per Cent of Accuracy |       |       |       |       |       |       |       |       |       |      | Medians | Per Cent of Variability |
|            | Medians              |       |                         |       |       |       |       |       |       |       | 0 to 49              | 50    | 60    | 70    | 80    | 90    | 100   |       |       |       |      |         |                         |
|            | Ac.                  | Rt.   | Per Cent of Variability |       |       |       |       |       |       |       |                      |       |       |       |       |       |       |       |       |       |      |         |                         |
| 1.....     | 42                   | 10    | 78                      | 100   | 85    | 115   | 315   | 55    | 4.2   | 21    | 94                   | 25    | 151   | 99    | 107   | 83    | 188   | 69    | 5.3   | 25    | 1    |         |                         |
| 2.....     | 1                    | ..... | 1                       | ..... | 2     | 2     | 14    | 35    | 1.5   | ..... | 7                    | ..... | 3     | 3     | 1     | 3     | 3     | 80    | 5.    | 25    | 2    |         |                         |
| 3.....     | 9                    | ..... | 9                       | ..... | 10    | 14    | 38    | 55    | 3.3   | 22    | 6                    | 1     | 16    | 13    | 12    | 15    | 27    | 63    | 4.    | 25    | 3    |         |                         |
| 4.....     | 16                   | 5     | 28                      | 20    | 32    | 32    | 76    | 58    | 4.8   | 21    | 18                   | 2     | 51    | 24    | 28    | 27    | 59    | 67    | 5.3   | 21    | 4    |         |                         |
| 5.....     | 10                   | ..... | 6                       | 14    | 11    | 12    | 18    | 65    | 3.7   | 22    | 15                   | 4     | 10    | 7     | 8     | 10    | 17    | 71    | 5.    | 32    | 5    |         |                         |
| 6.....     | 11                   | ..... | 15                      | 9     | 15    | 12    | 17    | 67    | 3.8   | 24    | 21                   | ..... | 26    | 6     | 10    | 4     | 10    | 83    | 4.7   | 21    | 6    |         |                         |
| 7.....     | 1                    | ..... | 1                       | ..... | 1     | 2     | 5     | 1     | 22    | 35    | 5                    | 1     | 2     | 4     | 3     | 2     | 15    | 55    | 5.1   | 24    | 7    |         |                         |
| 8.....     | 7                    | ..... | 7                       | ..... | 7     | 8     | 37    | 48    | 3.2   | ..... | 3                    | ..... | 7     | 10    | 12    | 10    | 29    | 57    | 4.2   | 20    | 8    |         |                         |
| 9.....     | 13                   | 7     | 24                      | 15    | 34    | 34    | 72    | 58    | 4.2   | 19    | 28                   | 6     | 40    | 22    | 28    | 26    | 49    | 69    | 5.2   | 26    | 9    |         |                         |
| 10.....    | 3                    | ..... | 5                       | 4     | 6     | 5     | 22    | 52    | 3.7   | 22    | 4                    | 1     | 11    | 4     | 5     | 5     | 15    | 66    | 4.9   | 28    | 10   |         |                         |
| 11.....    | 21                   | 3     | 31                      | 24    | 28    | 17    | 36    | 69    | 4.8   | 24    | 37                   | 4     | 36    | 20    | 18    | 24    | 21    | 78    | 5.5   | 22    | 11   |         |                         |
| 12.....    | 7                    | ..... | 15                      | 16    | 9     | 8     | 19    | 71    | 5.0   | 20    | 17                   | 2     | 12    | 14    | 9     | 6     | 14    | 76    | 5.9   | 23    | 12   |         |                         |
| 13.....    | 13                   | ..... | 18                      | 14    | 16    | 22    | 57    | 56    | 3.5   | 21    | 15                   | 5     | 34    | 19    | 17    | 17    | 33    | 72    | 5.1   | 29    | 13   |         |                         |
| 14.....    | 4                    | ..... | 5                       | 4     | 3     | 3     | 7     | 70    | 3.9   | 26    | 5                    | ..... | 2     | 3     | 4     | 2     | 10    | 62    | 3.    | 30    | 14   |         |                         |
| 15.....    | 10                   | 2     | 15                      | 12    | 3     | 5     | 18    | 76    | 5.7   | 25    | 20                   | ..... | 9     | 6     | 5     | 8     | 17    | 75    | 5.5   | 35    | 15   |         |                         |
| 16.....    | 9                    | ..... | 7                       | 1     | 8     | 5     | 19    | 61    | 3.7   | 31    | 6                    | ..... | 11    | 3     | 9     | 5     | 15    | 65    | 3.9   | 28    | 16   |         |                         |
| 17.....    | .....                | ..... | .....                   | 3     | 2     | 3     | 12    | 41    | 2.6   | ..... | 3                    | ..... | 4     | 1     | 5     | 1     | 6     | 66    | 4.5   | 29    | 17   |         |                         |
| 18.....    | 6                    | 1     | 5                       | 16    | 11    | 17    | 44    | 54    | 4.2   | 20    | 4                    | 3     | 17    | 19    | 16    | 15    | 26    | 66    | 5.3   | 23    | 18   |         |                         |
| 19.....    | .....                | ..... | .....                   | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....                | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 19   |         |                         |
| 20.....    | 5                    | ..... | 2                       | ..... | 5     | 5     | 4     | 64    | 4.2   | ..... | 5                    | 2     | 3     | 4     | 3     | 1     | 3     | 80    | 6.    | 21    | 20   |         |                         |
| 21.....    | 22                   | 5     | 15                      | 13    | 10    | 11    | 25    | 74    | 5.8   | 31    | 39                   | 5     | 26    | 15    | 3     | 5     | 8     | 87    | 7.7   | 18    | 21   |         |                         |
| 22.....    | 3                    | 1     | 9                       | 10    | 6     | 9     | 12    | 66    | 5.6   | 23    | 11                   | 3     | 12    | 5     | 5     | 8     | 6     | 81    | 6.8   | 22    | 22   |         |                         |
| Total..... | 213                  | 34    | 296                     | 291   | 308   | 340   | 884   | 59    | 4.2   | 20    | 363                  | 64    | 483   | 301   | 308   | 277   | 571   | 71    | 4.3   | 32    |      |         |                         |

TABLE IX.—CITY DISTRIBUTION: FIFTH GRADE—(Continued)  
F. PER CENT OF ACCURACY—MULTIPLICATION AND DIVISION

| CITY       | MULTIPLICATION       |       |       |       |       |                         |       |       |       |                         | DIVISION             |       |       |       |       |                         |       |       |       |                         | CITY |
|------------|----------------------|-------|-------|-------|-------|-------------------------|-------|-------|-------|-------------------------|----------------------|-------|-------|-------|-------|-------------------------|-------|-------|-------|-------------------------|------|
|            | Per Cent of Accuracy |       |       |       |       |                         |       |       |       |                         | Per Cent of Accuracy |       |       |       |       |                         |       |       |       |                         |      |
|            | Medians              |       |       |       |       | Per Cent of Variability |       |       |       |                         | Medians              |       |       |       |       | Per Cent of Variability |       |       |       |                         |      |
|            | 100                  | 90    | 80    | 70    | 60    | 50                      | 49    | Ac.   | Rt.   | Per Cent of Variability | 100                  | 90    | 80    | 70    | 60    | 50                      | 49    | Ac.   | Rt.   | Per Cent of Variability |      |
| 1.....     | 67                   | 7     | 81    | 70    | 125   | 106                     | 286   | 58    | 3.5   | 20                      | 155                  | 10    | 87    | 45    | 80    | 77                      | 289   | 61    | 2.9   | 32                      | 1    |
| 2.....     | 2                    | ..... | 4     | 1     | 2     | 4                       | 7     | 57    | 3.6   | 20                      | 3                    | ..... | 3     | 1     | ..... | 2                       | 11    | 45    | 2.2   | .....                   | 2    |
| 3.....     | 8                    | ..... | 14    | 7     | 12    | 15                      | 34    | 57    | 3.    | 21                      | 14                   | 1     | 10    | 6     | 8     | 12                      | 39    | 55    | 2.4   | 22                      | 3    |
| 4.....     | 21                   | 4     | 22    | 19    | 28    | 40                      | 75    | 58    | 4.0   | 19                      | 41                   | 2     | 30    | 17    | 30    | 23                      | 64    | 66    | 3.8   | 32                      | 4    |
| 5.....     | 17                   | ..... | 8     | 8     | 8     | 5                       | 25    | 67    | 3.6   | 29                      | 19                   | ..... | 4     | 6     | 10    | 11                      | 21    | 64    | 2.8   | 30                      | 5    |
| 6.....     | 24                   | ..... | 10    | 4     | 11    | 11                      | 18    | 69    | 2.9   | 28                      | 35                   | ..... | 3     | 6     | 7     | 6                       | 22    | 78    | 2.6   | 36                      | 6    |
| 7.....     | 7                    | ..... | 1     | 0     | 0     | 4                       | 1     | 23    | 34    | 2.                      | 2                    | ..... | 1     | 4     | 7     | 6                       | 12    | 56    | 2.    | 20                      | 7    |
| 8.....     | 2                    | ..... | 7     | 3     | 12    | 13                      | 34    | 52    | 3.2   | 20                      | 6                    | ..... | 4     | 8     | 11    | 7                       | 35    | 51    | 2.4   | 22                      | 8    |
| 9.....     | 14                   | 4     | 40    | 19    | 31    | 38                      | 53    | 63    | 4.2   | 26                      | 57                   | ..... | 28    | 18    | 21    | 23                      | 52    | 72    | 3.7   | 36                      | 9    |
| 10.....    | 3                    | ..... | 4     | 10    | 1     | 4                       | 23    | 50    | 2.6   | 0                       | 6                    | ..... | 6     | 3     | 7     | 1                       | 22    | 60    | 2.4   | 32                      | 10   |
| 11.....    | 32                   | 1     | 31    | 19    | 26    | 25                      | 26    | 72    | 4.    | 23                      | 57                   | 1     | 19    | 23    | 14    | 13                      | 33    | 79    | 3.9   | 33                      | 11   |
| 12.....    | 19                   | ..... | 18    | 8     | 9     | 10                      | 80    | 5.4   | 24    | 20                      | 28                   | ..... | 14    | 7     | 7     | 6                       | 11    | 84    | 4.6   | 23                      | 12   |
| 13.....    | 13                   | 2     | 22    | 13    | 21    | 17                      | 52    | 61    | 3.4   | 33                      | 20                   | 1     | 10    | 14    | 24    | 12                      | 61    | 59    | 2.5   | 20                      | 13   |
| 14.....    | 1                    | ..... | 2     | 3     | 4     | 3                       | 12    | 53    | 2.3   | 21                      | 4                    | ..... | ..... | ..... | 1     | 1                       | 20    | 32    | 7     | .....                   | 14   |
| 15.....    | 13                   | 3     | 11    | 7     | 3     | 6                       | 19    | 74    | 5.6   | 34                      | 21                   | 1     | 9     | 11    | 4     | 2                       | 14    | 80    | 5.7   | 24                      | 15   |
| 16.....    | 7                    | ..... | 7     | 1     | 9     | 5                       | 20    | 60    | 3.    | 31                      | 8                    | ..... | 6     | 3     | 4     | 7                       | 21    | 56    | 2.3   | 22                      | 16   |
| 17.....    | .....                | ..... | 3     | 4     | ..... | 3                       | 10    | 50    | 3.4   | .....                   | 2                    | ..... | 1     | ..... | 1     | 1                       | 15    | 33    | 1.4   | .....                   | 17   |
| 18.....    | 10                   | ..... | 17    | 7     | 12    | 26                      | 28    | 59    | 4.    | 19                      | 26                   | 2     | 11    | 7     | 16    | 14                      | 24    | 68    | 4.    | 28                      | 18   |
| 19.....    | .....                | ..... | ..... | ..... | ..... | .....                   | ..... | ..... | ..... | .....                   | .....                | ..... | ..... | ..... | ..... | .....                   | ..... | ..... | ..... | .....                   | 19   |
| 20.....    | 1                    | ..... | 4     | 2     | 3     | 2                       | 9     | 60    | 3.5   | 30                      | 9                    | ..... | ..... | ..... | 2     | 4                       | 5     | 65    | 2.    | 35                      | 20   |
| 21.....    | 17                   | 5     | 29    | 12    | 13    | 10                      | 14    | 80    | 6.2   | 20                      | 30                   | 1     | 14    | 10    | 9     | 13                      | 23    | 75    | 4.2   | 34                      | 21   |
| 22.....    | 10                   | 3     | 14    | 7     | 3     | 4                       | 10    | 81    | 6.3   | 20                      | 11                   | 5     | 11    | 4     | 3     | 6                       | 9     | 83    | 5.3   | 23                      | 22   |
| Total..... | 284                  | 30    | 348   | 224   | 337   | 347                     | 788   | 61    | 3.7   | 33                      | 554                  | 24    | 271   | 193   | 266   | 247                     | 803   | 65    | 3.3   | 34                      |      |

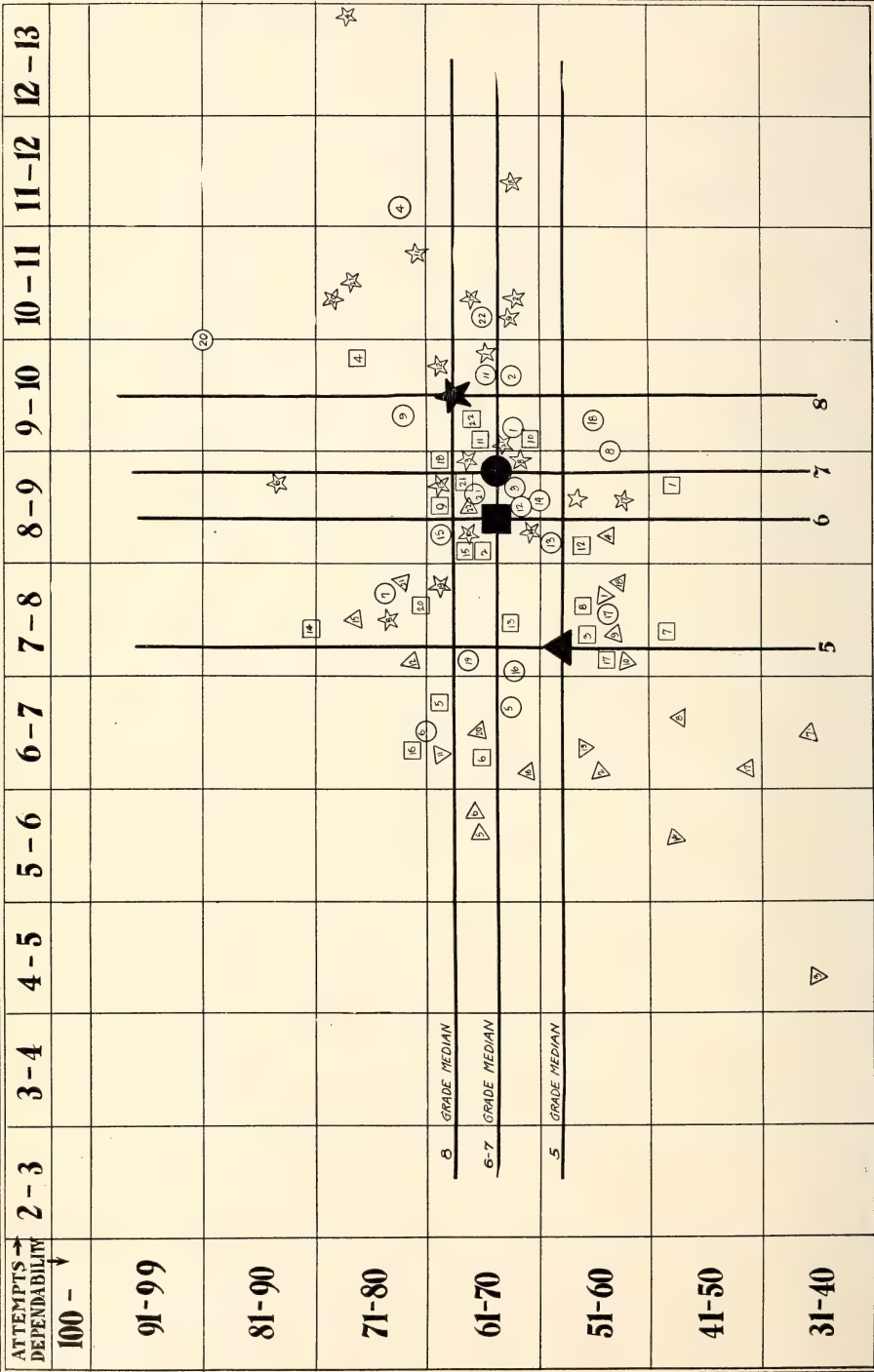


FIG. 1. MEDIAN SCORES IN SPEED AND ACCURACY IN ADDITION IN TWENTY-TWO CITIES

Figures at left indicate per cent of dependability. Figures at top indicate number of problems attempted. Symbols: Triangle = grade 5; square = grade 6; circle = grade 7; star = grade 8; heavy vertical lines = median of speed of all cities; heavy horizontal lines = medians of dependability of all cities. Exact location of grades medians is indicated by heavy symbol at junction of two median lines. Figure within symbols = individual cities.

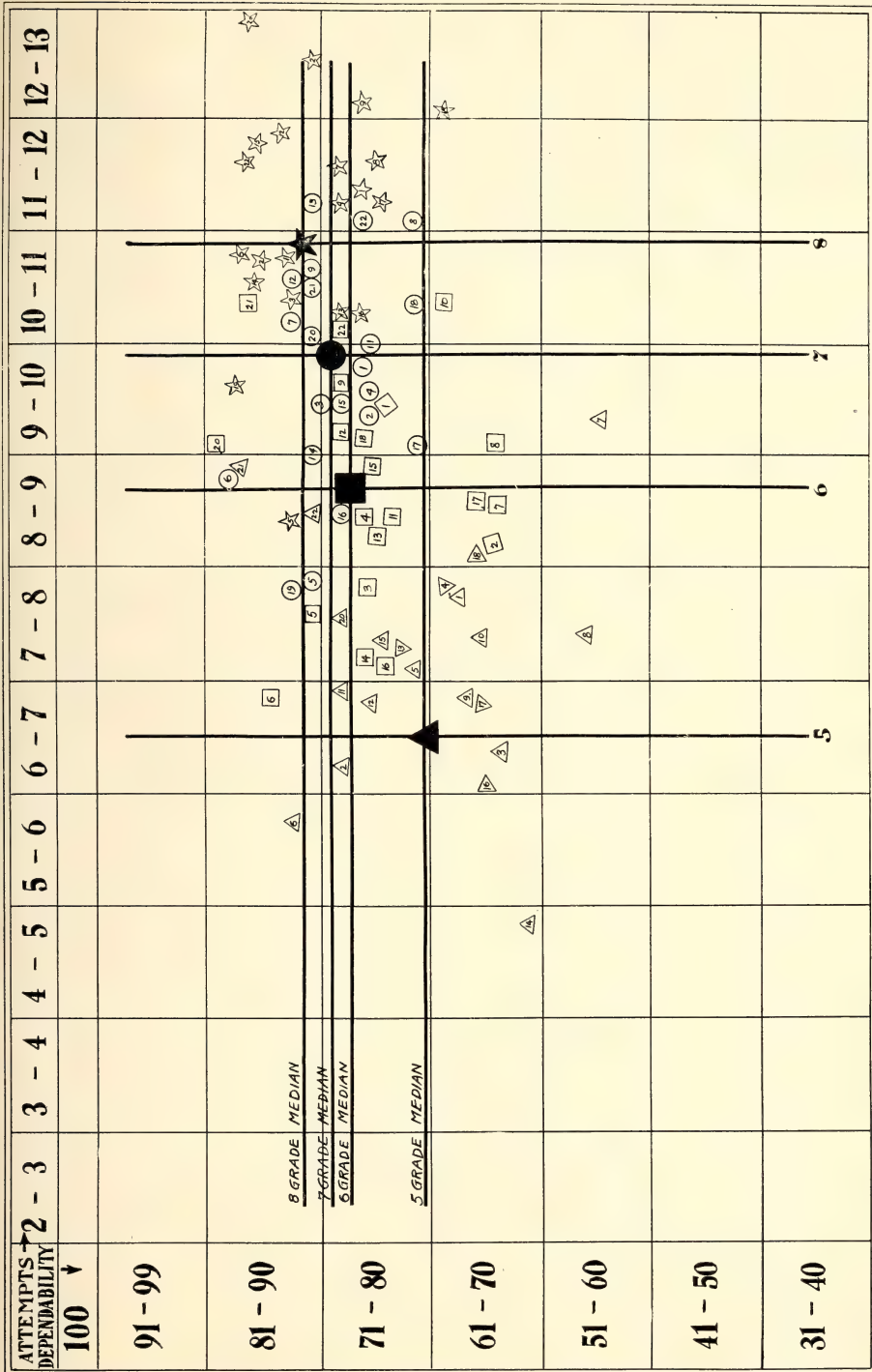


FIG. 2. MEDIAN SCORES IN SPEED AND ACCURACY IN SUBTRACTION IN TWENTY-TWO CITIES  
(See Fig. 1 for explanations.)



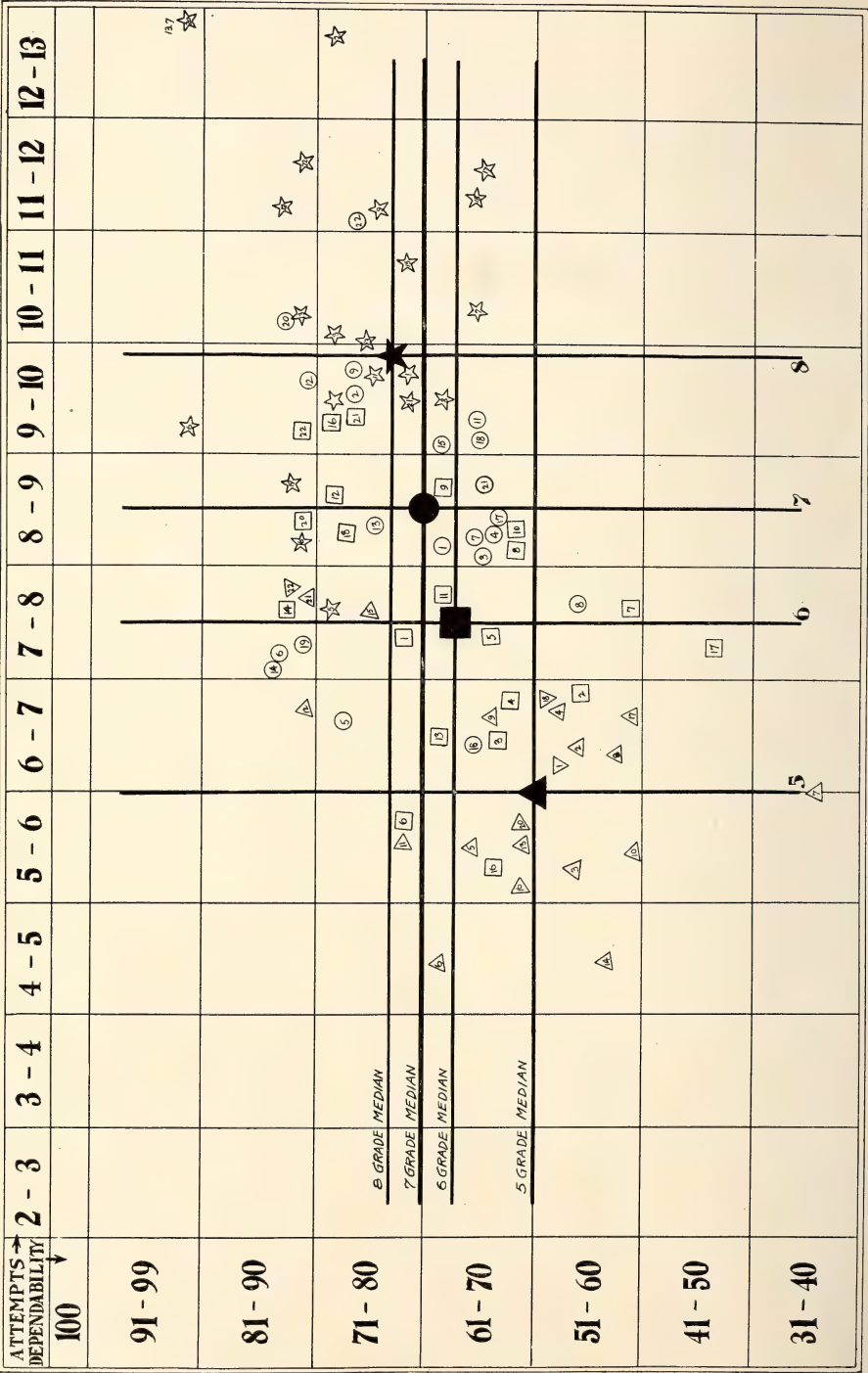


Fig. 3. MEDIAN SCORES IN SPEED AND ACCURACY IN MULTIPLICATION FOR TWENTY-TWO CITIES  
(See Fig. 1 for explanations.)

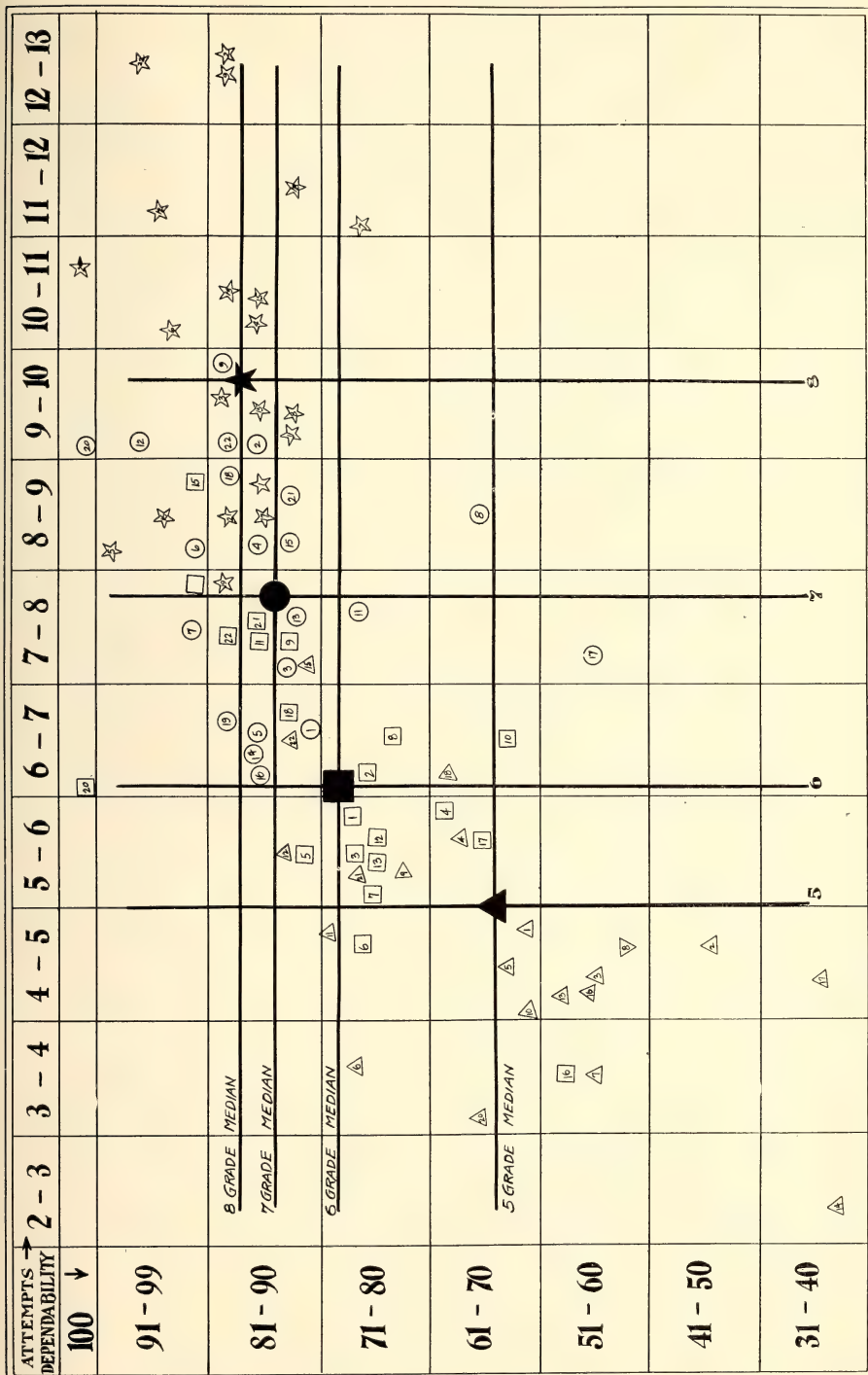


FIG. 4. MEDIAN SCORES IN SPEED AND ACCURACY IN DIVISION FOR TWENTY-TWO CITIES  
(See Fig. 1 for explanations.)

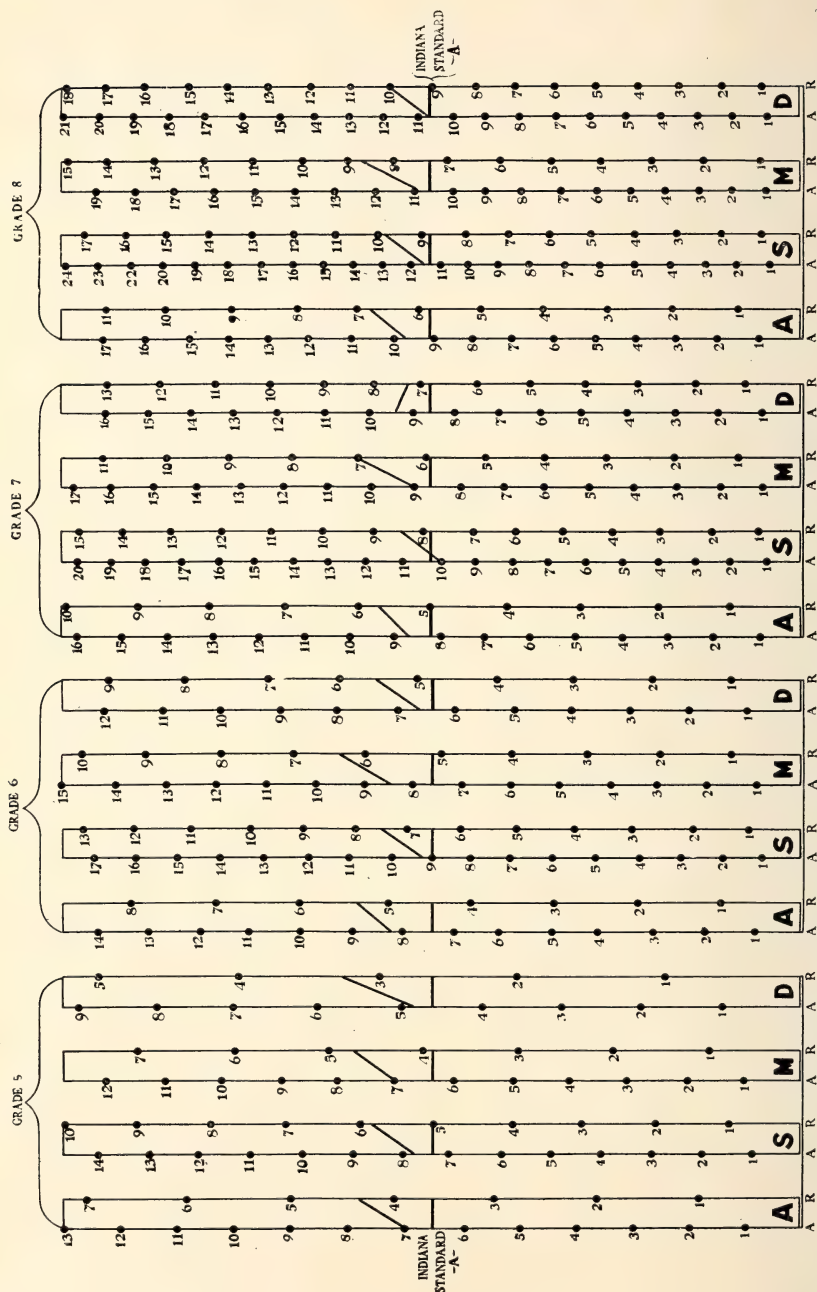


Fig. 5. MEDIAN SCORES FOR 16 CITIES AND TOWNS IN KANSAS GRAPHED ON INDIANA STANDARD CHART (APPROXIMATELY 10,000 CHILDREN)

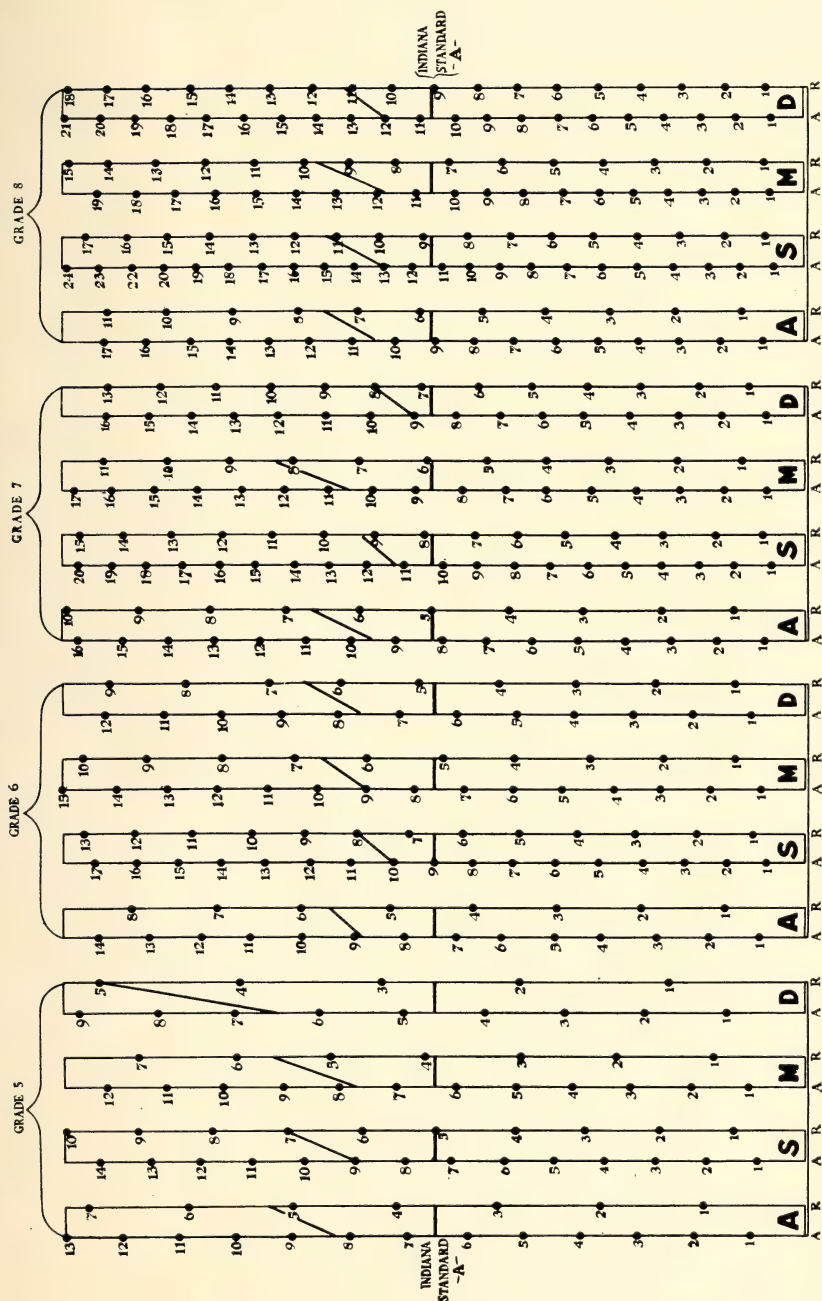


FIG. 6. MEDIAN SCORES FOR NINE CITIES AND TOWNS IN IOWA GRAPHED ON INDIANA STANDARD (APPROXIMATELY 10,000 CHILDREN)

(See Fig. 1 for explanations.)

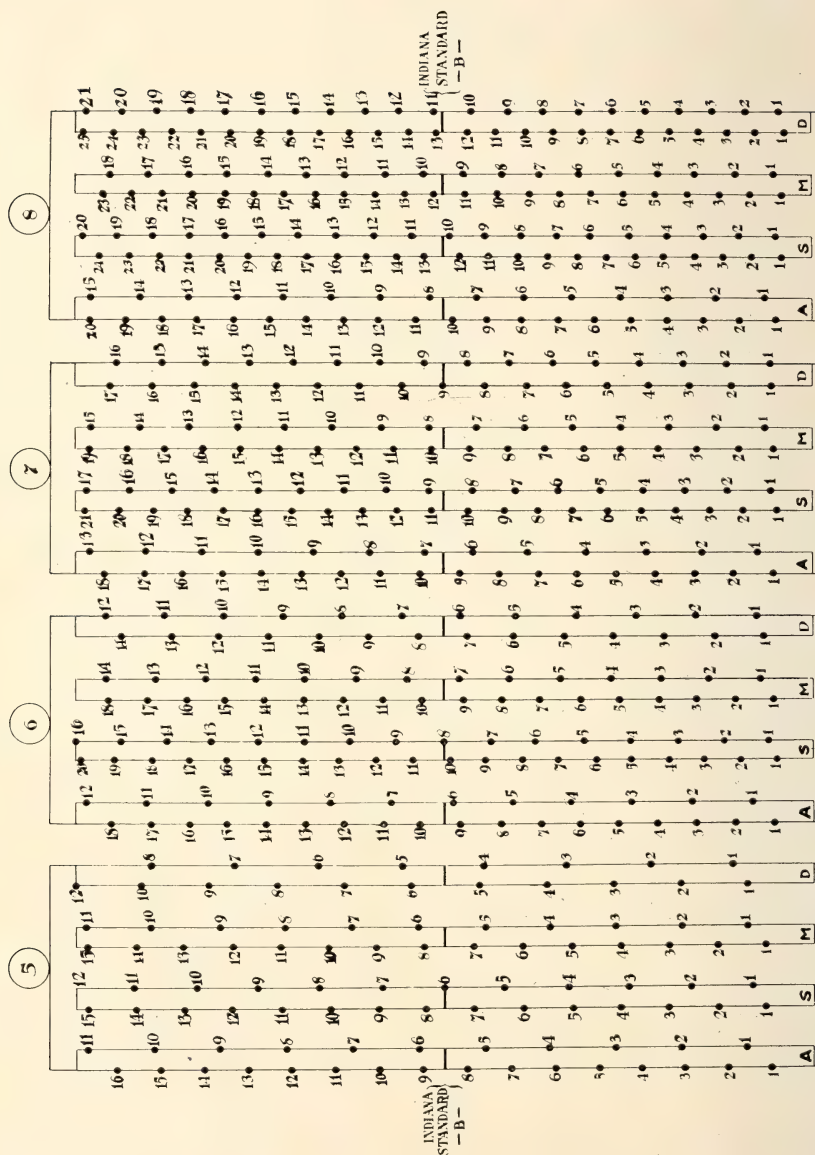


FIG. 7



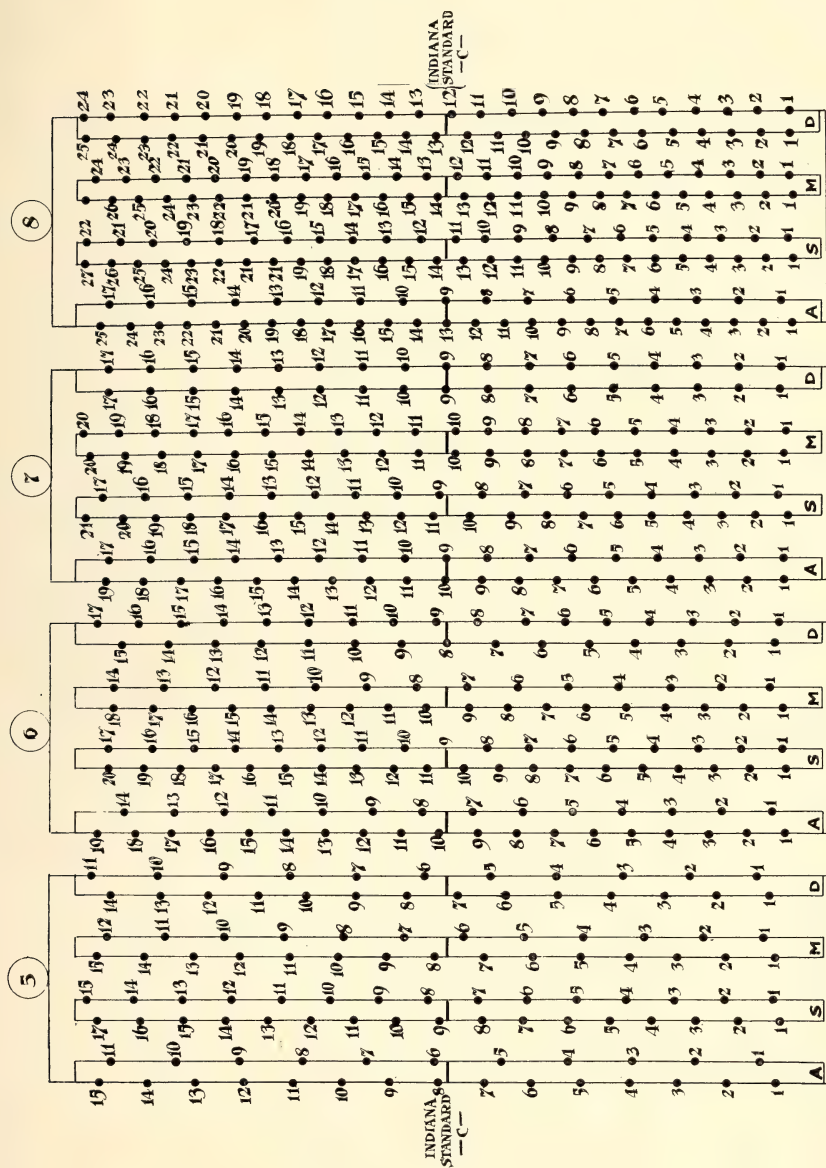


FIG. 8

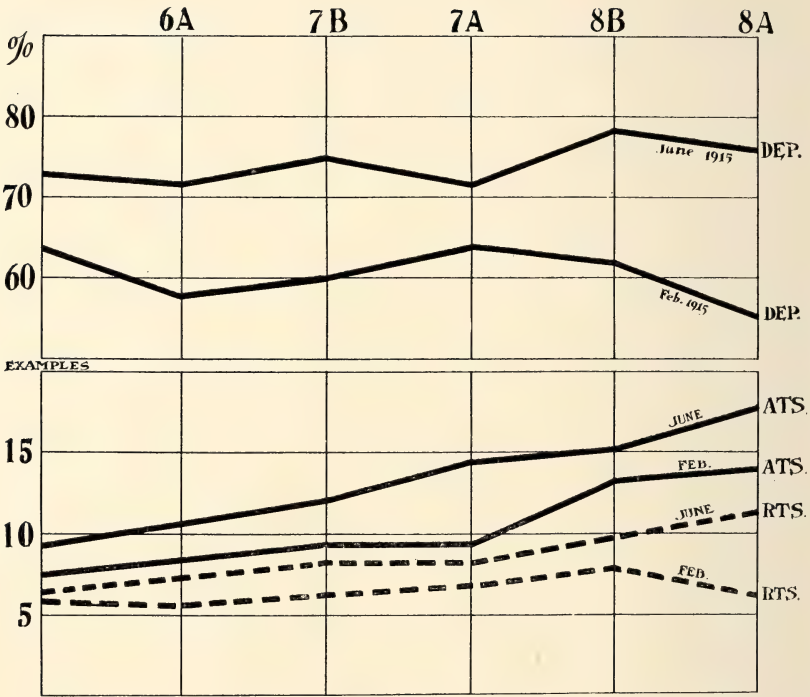


FIG. 9. CHANGE IN ATTEMPTS, RIGHTS, AND DEPENDABILITY IN ADDITION FROM FEBRUARY TO JUNE

## II. ARITHMETIC TESTS IN THE RURAL SCHOOLS OF FIVE INDIANA COUNTIES

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By PAUL R. MORT.

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### INTRODUCTION

This study is based upon Courtis Arithmetic Test reports of the tests made in the spring of 1915 in the counties of Wabash, Huntington, Lake, Warren, and Randolph. Wabash county was reported by Superintendent Robert K. Devricks; Huntington county by Superintendent Clifford Funderburg; Lake county by Supervisor E. A. Whitney; Warren county by Superintendent Harry Evans. Superintendents Funderburg and Devricks made much of this study possible by coöperating in giving a questionnaire in their schools.

The first part sums up the general conditions in these counties and points out a few comparisons. The second is a discussion of some of the factors influencing achievement in the fundamental processes of arithmetic. The third is a discussion of the results obtained from retarded pupils (i.e. those who have failed one or more times) in eight townships.

Two plans were followed to insure dependability in the conclusions of the second part. In the first place, no conclusions were drawn from any set of comparisons unless the induction from those comparisons agreed with that from the comparison of the "regulars" (i.e. those who are in the classes with which they entered school) in those eight townships for which the distributions of the scores were made on the basis of retardation. This eliminated the influence of the retarded pupils. In the second place, no conclusions were drawn that were not borne out by the results in at least two counties, and thus by two widely different sets of conditions.

The limitation arising from the small number of cases considered is offset to some degree by the large representation of schools (67 schools in 8 townships, alone). This tends to eliminate the influence of abnormal local conditions.

RESULTS FROM THE DISTRICT AND GRADED SCHOOLS OF FIVE  
COUNTY SYSTEMS

In this division I attempt but little more than to give the descriptions of the systems concerned as they were reported.

All of Wabash county with the exception of one township has had the eight months' term for a number of years. The township excepted has had it for but three years. There are seven townships in the county each having from one to five graded (consolidated or combined)<sup>1</sup> schools of from two to four teachers each, and each, with one exception, having a number of district schools. The ratio of children in district schools (upper four grades considered) to those in graded schools is 376 to 757. The system of township supervision has been practiced thruout the county for a number of years. In this system the principal of one of the township high schools has all the township schools under his direct supervision. The teaching of arithmetic is begun in the first grade.

In Huntington county the length of term varies from six and one-half to seven months. Each township has one graded school with two teachers. The ratio of district school children to graded school children is 315 to 71. The township supervision system was in use in one township only, and then for but two years, preceding the giving of the tests.<sup>2</sup> No special supervision is given as to time of beginning of the teaching of arithmetic.

Lake county had had the nine months' term for six years preceding the giving of the tests. There are ten townships under the supervision of the county superintendent, which are, with one exception, for the most part consolidated. There are also five villages under the county superintendent, but these have separate school boards.

The four Warren county towns are under the supervision of the county superintendent.

Only one Randolph county school was reported. This is a consolidated school having both local and county supervision.

The length of recitation periods for the same type of schools varies very little.

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<sup>1</sup>Combined schools are those supplanting two or three district schools and generally have no more than two teachers. Consolidated schools are those supplanting several district schools.

<sup>2</sup>In the fall of 1915 a supervision system similar to that in use in Wabash county was adopted.

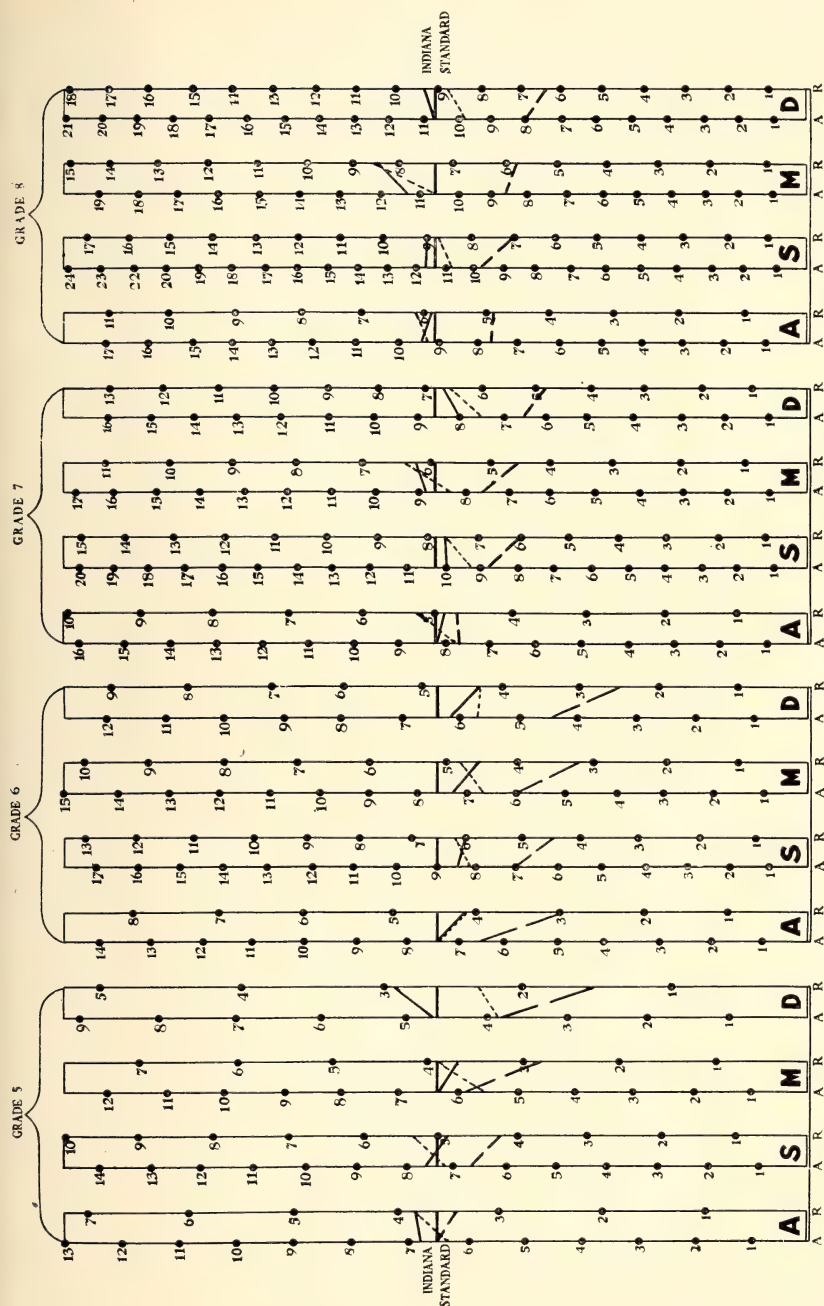


FIG. 1. COMPARISON OF THREE COUNTY SYSTEMS WITH THE INDIANA CITY STANDARD OF 1914

The unbroken lines represent Wabash County; broken lines, Huntington county; dotted lines, Lake county. See note 3, p. 63.



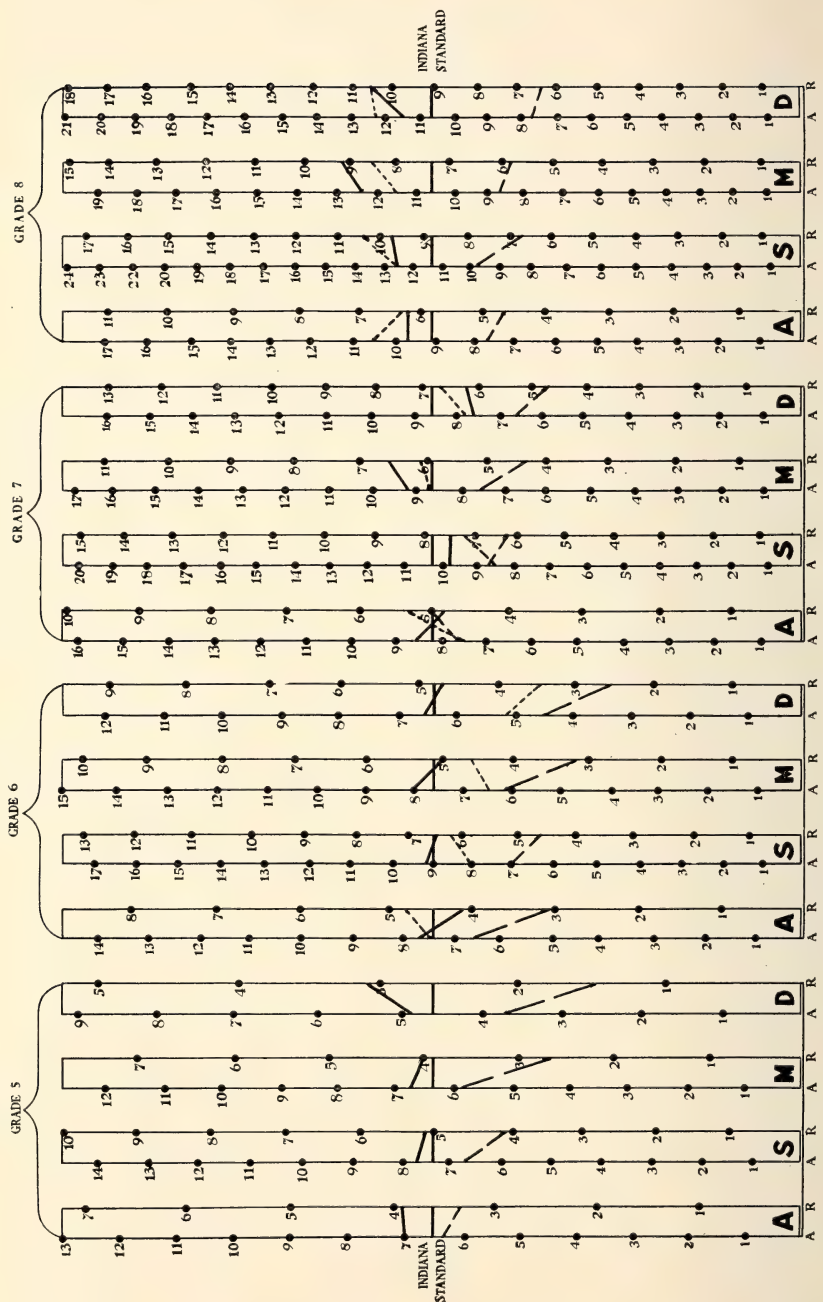


FIG. 2. COMPARISON OF DISTRICT SCHOOLS OF THREE COUNTIES WITH INDIANA CITY STANDARD OF 1914

The unbroken lines represent Wabash county; broken lines, Huntington county; the dotted lines, Lake county. See note 3, p. 63.

Table I groups the results from the different systems so that they are comparable. Figures 1 and 2<sup>3</sup> show the standing of the county systems compared with the average of the twenty Indiana cities tested in 1914, which average is represented by the lines marked "Indiana Standard". I wish to call attention to but three points here: the improvement shown by the second testing of Warren county, the uniformity of the results from the different systems, and what it means for a system to be up to standard.

Superintendent Harry Evans of Warren county, in discussing the improvement shown by the second testing, states that after giving the first tests he gave the results to the teachers and pointed out a few weaknesses, but did not introduce any constructive work. He thinks, however, that the pointing out of the weaknesses probably served as a stimulus to both teacher and pupil. He also mentions the fright of the children at the first testing.

As for the second point, an examination of Table I shows but a slight degree of variation in results from different systems as compared with the twenty Indiana cities<sup>4</sup> tested in 1914. There are of course many factors entering into this, some of which are discussed later in this Study, but supervision probably has as much to do with the variations in the case of the city scores as any other one factor. Might, then, the uniformity in the systems here given be due to their comparative lack of supervision?

The point as to the meaning of the standard remains. It will be noticed that in a great many places the scores of the county systems exceed the Indiana Standard. If we are to take this standard in any case as the minimum score which a child should have, and the maximum necessary for him to have, we might conclude that no further work is needed in these classes in fundamentals of arithmetic. This conclusion would be erroneous for when the median score of a group is equal to the standard only 50 per cent of the group have a score equal to or exceeding the standard. There is still work to be done with the low 50 per cent. These individual cases should be examined carefully to discover whether the low scores are the results of wrong grading or of some obstacle. Attention can be given to these while the standard

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<sup>3</sup>In figures 1 and 2 the greater the height of the left end of the graph, the greater the "speed". The greater the slope upward toward the right the greater the per cent of accuracy or "dependability". Equal heights represent equivalent speeds thruout. Equal slopes represent equivalent dependabilities.

<sup>4</sup>See *Second Annual Conference on Educational Measurements*, (Indiana University Bulletin, XIII, No. 11), p. 26.

TABLE I.—COURTIS STANDARD TESTS: ARITHMETIC, SERIES B

| County System       | Description  | Time of Giving Tests     | GRADE FIVE       |                |       |                |       |                | GRADE SIX       |                |       |                |       |                |          |                |       |                |       |                |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
|---------------------|--|--------------------------|------------------|----------------|-------|----------------|-------|----------------|-----------------|----------------|-------|----------------|-------|----------------|----------|----------------|-------|----------------|-------|----------------|-----------------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|---------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------------|------------------------|------------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|----|-----|----|-----|----|-----|----|---------------------|-------------------------|------------------|-----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|---------------|------------------------|--------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|----|-----|----|-----|----|-----|----|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------------|------------------------|------------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|----|-----|----|-----|----|-----|----|---------------------|-------------------------|------------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|-----------------|---------------------|--------------------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|-----------------|----------------------|--------------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|-------------------|-------------------------------------|----------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|
|                     |  |                          | Number of Pupils |                |       | Sub-traction   |       |                | Multi-plication |                |       | Division       |       |                | Addition |                |       | Sub-traction   |       |                | Multi-plication |                |       | Division       |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
|                     |  |                          |                  |                |       |                |       |                |                 |                |       |                |       |                |          |                |       |                |       |                |                 |                |       |                |       |                | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | COUNTY TOTALS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Wabash. . . . . | Entire county. . . . . | Last of February | 347 | 6.8 | 56 | 7.5 | 65 | 6.3 | 59 | 4.7 | 61 | 303 | 7.4 | 56 | 8.4 | 71 | 7.2 | 64 | 6.1 | 70 | Huntington. . . . . | Four townships. . . . . | Last of February | 114 | 6.6 | 53 | 6.6 | 64 | 5.9 | 48 | 3.8 | 40 | 96 | 6.4 | 47 | 7.0 | 64 | 6.0 | 53 | 4.4 | 56 | Lake. . . . . | Entire county. . . . . | May. . . . . | 211 | 6.4 | 60 | 7.1 | 74 | 5.6 | 68 | 3.9 | 58 | 204 | 7.4 | 56 | 8.1 | 77 | 6.7 | 71 | 5.7 | 75 | GRADED SCHOOLS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Wabash. . . . . | Entire county. . . . . | Last of February | 224 | 6.6 | 55 | 7.4 | 64 | 6.1 | 59 | 4.5 | 59 | 200 | 7.2 | 57 | 8.1 | 71 | 6.8 | 65 | 5.8 | 70 | Huntington. . . . . | Four townships. . . . . | Last of February | 14 | 6.5 | 53 | 5.5 | 67 | 5.3 | 43 | 3.5 | 60 | 20 | 6.5 | 53 | 7.0 | 53 | 6.0 | 53 | 4.0 | 53 | Warren. . . . . | Four towns. . . . . | First test, Feb. . . . . | 59 | 6.0 | 62 | 6.6 | 75 | 5.9 | 61 | 3.9 | 58 | 53 | 6.9 | 67 | 7.6 | 84 | 6.6 | 73 | 5.5 | 90 | Warren. . . . . | Three towns. . . . . | Second test, April | 50 | 6.4 | 58 | 7.3 | 82 | 5.8 | 72 | 4.8 | 74 | 49 | 7.5 | 68 | 9.3 | 81 | 7.4 | 76 | 7.3 | 87 | Randolph. . . . . | McKinley Con-<br>solidated. . . . . | March. . . . . | 16 | 6.0 | 58 | 7.5 | 57 | 6.7 | 60 | 5.0 | 55 | 26 | 7.3 | 60 | 8.4 | 68 | 7.6 |
|                     |  |                          | Speed            | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed           | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed    | Depend-ability | Speed | Depend-ability | Speed | Depend-ability | Speed           | Depend-ability | Speed | Depend-ability | Speed | Depend-ability |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| COUNTY TOTALS       |  |                          |                  |                |       |                |       |                |                 |                |       |                |       |                |          |                |       |                |       |                |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Wabash. . . . .     | Entire county. . . . .   | Last of February         | 347              | 6.8            | 56    | 7.5            | 65    | 6.3            | 59              | 4.7            | 61    | 303            | 7.4   | 56             | 8.4      | 71             | 7.2   | 64             | 6.1   | 70             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Huntington. . . . . | Four townships. . . . .  | Last of February         | 114              | 6.6            | 53    | 6.6            | 64    | 5.9            | 48              | 3.8            | 40    | 96             | 6.4   | 47             | 7.0      | 64             | 6.0   | 53             | 4.4   | 56             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Lake. . . . .       | Entire county. . . . .   | May. . . . .             | 211              | 6.4            | 60    | 7.1            | 74    | 5.6            | 68              | 3.9            | 58    | 204            | 7.4   | 56             | 8.1      | 77             | 6.7   | 71             | 5.7   | 75             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| GRADED SCHOOLS      |  |                          |                  |                |       |                |       |                |                 |                |       |                |       |                |          |                |       |                |       |                |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Wabash. . . . .     | Entire county. . . . .   | Last of February         | 224              | 6.6            | 55    | 7.4            | 64    | 6.1            | 59              | 4.5            | 59    | 200            | 7.2   | 57             | 8.1      | 71             | 6.8   | 65             | 5.8   | 70             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Huntington. . . . . | Four townships. . . . .  | Last of February         | 14               | 6.5            | 53    | 5.5            | 67    | 5.3            | 43              | 3.5            | 60    | 20             | 6.5   | 53             | 7.0      | 53             | 6.0   | 53             | 4.0   | 53             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Warren. . . . .     | Four towns. . . . .  | First test, Feb. . . . . | 59               | 6.0            | 62    | 6.6            | 75    | 5.9            | 61              | 3.9            | 58    | 53             | 6.9   | 67             | 7.6      | 84             | 6.6   | 73             | 5.5   | 90             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Warren. . . . .     | Three towns. . . . .   | Second test, April       | 50               | 6.4            | 58    | 7.3            | 82    | 5.8            | 72              | 4.8            | 74    | 49             | 7.5   | 68             | 9.3      | 81             | 7.4   | 76             | 7.3   | 87             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Randolph. . . . .   | McKinley Con-<br>solidated. . . . .  | March. . . . .           | 16               | 6.0            | 58    | 7.5            | 57    | 6.7            | 60              | 5.0            | 55    | 26             | 7.3   | 60             | 8.4      | 68             | 7.6   | 55             | 5.9   | 85             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |
| Lake. . . . .       | Grades 6 and 8,<br>towns and con-<br>solidated:grades<br>5 and 7, con-<br>solidated. . . . . | April to May. . . . .    | 44               | 6.4            | 61    | 6.9            | 80    | 5.5            | 70              | 4.1            | 56    | 94             | 6.9   | 56             | 8.3      | 78             | 6.9   | 69             | 6.0   | 78             |                 |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |       |                |               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |     |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |               |                        |              |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                        |                  |     |     |    |     |    |     |    |     |    |     |     |    |     |    |     |    |     |    |                     |                         |                  |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                     |                          |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                 |                      |                    |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |                   |                                     |                |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |

## DISTRICT SCHOOLS

|              |                   |       |       |       |       |       |       |       |       |       |     |     |    |     |    |     |    |     |    |
|--------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|----|-----|----|-----|----|-----|----|
| Wabash. .... | Entire county.... | 123   | 7.0   | 56    | 7.7   | 66    | 6.7   | 59    | 4.9   | 64    | 102 | 7.6 | 54 | 9.1 | 71 | 8.0 | 62 | 6.5 | 72 |
| Huntington.. | Last of February  | 83    | 6.4   | 52    | 6.7   | 61    | 5.8   | 47    | 3.7   | 40    | 73  | 6.5 | 47 | 7.0 | 65 | 6.1 | 53 | 4.5 | 57 |
| Lake.....    | Four townships..  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 47  | 7.4 | 65 | 8.0 | 78 | 6.4 | 72 | 5.1 | 67 |
|              | Three townships.  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |     |     |    |     |    |     |    |     |    |

TABLE I.—COURTIS STANDARD TESTS: ARITHMETIC, SERIES B—(Continued)

| County System  | Description   | Time of Giving Tests, Year 1915 | GRADE SEVEN      |                    |         |                    |         |                    | GRADE EIGHT         |                    |         |                    |         |                    |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
|----------------|---|---------------------------------|------------------|--------------------|---------|--------------------|---------|--------------------|---------------------|--------------------|---------|--------------------|---------|--------------------|------------------|--------------------|-------|--------------------|-------|--------------------|---------------------|--------------------|-------|--------------------|-------|--------------------|
|                |   |                                 | Number of Pupils |                    |         | Subtraction        |         |                    | Multi-<br>plication |                    |         | Division           |         |                    | Number of Pupils |                    |       | Subtraction        |       |                    | Multi-<br>plication |                    |       | Division           |       |                    |
|                |   |                                 | Speed            | Depend-<br>ability | Speed   | Depend-<br>ability | Speed   | Depend-<br>ability | Speed               | Depend-<br>ability | Speed   | Depend-<br>ability | Speed   | Depend-<br>ability | Speed            | Depend-<br>ability | Speed | Depend-<br>ability | Speed | Depend-<br>ability | Speed               | Depend-<br>ability | Speed | Depend-<br>ability | Speed | Depend-<br>ability |
| COUNTY TOTALS  |   |                                 |                  |                    |         |                    |         |                    |                     |                    |         |                    |         |                    |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Wabash.....    | Entire county....   | Last of February                | 265              | 8.1                | 60 10.0 | 77 8.9             | 70 8.0  | 84 8.0             | 225                 | 9.4                | 63 11.7 | 77 11.3            | 74 10.7 | 87                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Huntington..   | Four townships..  | Last of February                | 107              | 7.7                | 61 8.7  | 69 7.6             | 61 6.5  | 76 7.5             | 98                  | 7.7                | 63 9.8  | 72 8.6             | 68 8.0  | 80                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Lake.....      | Entire county....   | May.....                        | 130              | 7.8                | 67 9.2  | 84 8.3             | 76 7.5  | 88                 | 145                 | 9.2                | 66 10.9 | 82 10.6            | 80 9.9  | 89                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| GRADED SCHOOLS |   |                                 |                  |                    |         |                    |         |                    |                     |                    |         |                    |         |                    |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Wabash.....    | Entire county....   | Last of February                | 180              | 8.0                | 62 10.1 | 77 8.8             | 70 8.3  | 85 8.3             | 153                 | 9.3                | 63 11.2 | 78 11.0            | 74 10.4 | 86                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Huntington..   | Four townships..  | Last of February                | 19               | 7.7                | 58 8.0  | 64 7.0             | 64 6.3  | 83 6.3             | 18                  | 7.7                | 72 10.2 | 78 9.3             | 70 8.5  | 80                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Warren.....    | Four towns.....   | First test, Feb....             | 43               | 6.3                | 65 8.1  | 82 6.3             | 73 6.6  | 90 6.6             | 45                  | 6.7                | 68 9.1  | 79 7.9             | 77 8.8  | 89                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Warren.....    | Three towns.....  | Second test, April              | 36               | 8.6                | 81 9.5  | 86 8.5             | 84 9.4  | 87 9.4             | 37                  | 8.4                | 74 11.1 | 87 10.3            | 83 11.2 | 100                |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Randolph....   | McKinley Con-<br>solidated.....   | March.....                      | 18               | 7.7                | 70 7.3  | 73 9.4             | 80 10.0 | 80 10.0            | 14                  | 7.0                | 57 8.8  | 65 9.0             | 73 8.0  | 80                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |
| Lake.....      | Grades 6 and 8,<br>towns and con-<br>solidated; grades<br>5 and 7, con-<br>solidated..... | April to May....                | 36               | 8.0                | 70 9.6  | 86 7.4             | 80 7.4  | 100                | 56                  | 8.7                | 68 10.1 | 81 10.1            | 81 9.4  | 90                 |                  |                    |       |                    |       |                    |                     |                    |       |                    |       |                    |



## DISTRICT SCHOOLS

[illegible]

50 per cent are working on something else. Theoretically, a system might be made perfect in this manner without changing the median of the group. The progress would show in the form of decreased variabilities. (Variability shows how far the individuals in a distribution are distributed from the median; a decreased variability shows that the individuals are clustering more closely to the median.) Such analytical work is now being attempted in Wabash county. The conditions of the entire township are first studied in a township institute; then the teachers with the help of the supervisor take up their individual problems, using the individual score sheets as guides. Care is taken to keep the teachers from overrating the importance of this work.

#### FACTORS AFFECTING ACHIEVEMENT IN THE FUNDAMENTALS OF ARITHMETIC

*The Graded vs. the District School.*—The district scores exceed the graded as follows: (1) Wabash county regulars (Table II)<sup>5</sup> in 8 out of 11 determining cases;<sup>6</sup> (2) Huntington county regulars (Table II), 9 out of 15; (3) Wabash county totals (Table I) in 10 out of 12; (4) those from the sixth and the seventh grade in three townships in Lake county (Table I) in 4 out of 6.

The graded exceed the district in the Huntington county totals (Table I) in 8 out of 15 determining cases.

These data point to the conclusion that the district schools are more efficient in procuring achievement in the functions measured than the graded. This is probably due to the emphasis placed on the newer lines of work, such as drawing and manual arts, in the graded schools. The fact that Huntington county, having but two teachers in each graded school, has not emphasized the newer lines so much probably accounts for the exception to the conclusion given in the last statement of the summary of the data.

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<sup>5</sup>Explanation to Table II: The Variabilities are from the totals. The Regulars are those who have made a grade each year. The Retarded are those who have repeated one or more grades, one or more times. The Accelerated are those who have skipped one or more grades so that they are in advance of the classes with which they entered school. The Graded groups are those who have spent more than one-half of their school life in schools with more than one teacher. The District groups are those who have spent more than one-half of their school life in one-teacher schools.

<sup>6</sup>A "case" is the comparison of scores for one function, such as addition in any grade; a marked difference in scores is considered a "determining case".

*The Length of Term.*—Table II shows that the shorter term regulars exceed those of the longer term in 8 out of 14 determining cases in Wabash county, and in 8 out of 12 in Huntington county. The same explanation applies here as in the previous paragraph. This condition also is probably due to the teachers being “crowded down” to the older subjects in the curriculum.

County Superintendents Devricks and Funderburg have both offered further explanations which have had important local application in our inter-township studies.<sup>7</sup> The two most important of these are the influences of close supervision and local school interest.

*Influence of the Quality of Gradation on the Class Score.*—The good gradation that results from efficient supervision is effective not only in obtaining better results from the individuals, but may affect the score of a class without influencing the scores of the individuals in the class. Suppose, for instance, that several children whose scores were equal to the fifth grade standard were wrongly placed in the sixth grade. Here these scores would fall below standard and would lower the sixth grade score. Were this incorrect gradation a common thing thruout a school the grade scores would be low. Were the gradation corrected the grade scores would rise. An investigation showed this to account for more than one-half the difference between two sets of scores, in one system tested. This principle probably helps to account for high scores in the eighth grade in some instances, since the passing of the children from that grade is the only place the superintendent gets a hand in gradation in many county systems.

*Supervision.*—Applying the principles developed in the preceding paragraphs to the comparison of the results from Wabash and Huntington counties we find two conditions in each county that tend to make it stand the higher. For Huntington county these are the shorter term and the greater per cent of district schools. For Wabash county they are the better gradation resulting from the township supervision system, and the definite standards set for attainment in arithmetic from the first grade up. Reference to Table II shows that the Wabash county regulars exceed in 14 out of 16 determining cases, while Figure I shows that the totals exceed in all 15 determining cases and that it has less variability in 19 out of 29. We may conclude, then, that the

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<sup>7</sup>For the Inter-township study of Wabash county see *Wabash County Teachers' Manual*, 1915-16, pp. 47-62.

TABLE II.—TESTS FOR FOUR TOWNSHIPS IN WABASH COUNTY  
(See note 5, p. 68)

| GRADE 5          |          |                |             |                |                |                |          |                |                  | GRADE 6  |                |             |                |                |                |          |                |    |  |
|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----------------|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----------------|----|--|
| Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |                | Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |                |    |  |
|                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability | Speed    | Depend-ability |                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability | Speed    | Depend-ability |    |  |
|                  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| TOTALS           |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| Total.....       | 160      | 6.9            | 54          | 7.5            | 68             | 6.6            | 58       | 4.8            | 62               | 125      | 7.3            | 55          | 8.4            | 74             | 7.7            | 64       | 6.4            | 76 |  |
| Variability..... |          | 22             | 17          | 20             | 25             | 21             | 21       | 29             | 29               |          | 19             | 22          | 17             | 20             | 19             | 25       | 25             | 26 |  |
| Regulars.....    | 75       | 6.6            | 55          | 7.6            | 72             | 6.2            | 65       | 4.6            | 59               | 55       | 6.8            | 59          | 8.2            | 77             | 7.7            | 70       | 6.4            | 82 |  |
| Retarded....     | 77       | 7.3            | 50          | 7.7            | 65             | 7.1            | 55       | 5.1            | 65               | 68       | 7.5            | 53          | 8.5            | 72             | 7.7            | 61       | 6.3            | 71 |  |
| Accelerated..    | 8        | 7.0            | 63          | 7.0            | 39             | 6.0            | 50       | 4.0            | 60               | 2        | 7.0            | 60          | 7.5            | 65             | 7.5            | 55       | 5.5            | 85 |  |
| GRADED GROUPS    |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| Total.....       | 62       | 6.7            | 54          | 7.4            | 70             | 6.3            | 57       | 4.5            | 63               | 60       | 6.6            | 58          | 7.9            | 76             | 7.2            | 70       | 6.0            | 72 |  |
| Regulars.....    | 34       | 6.6            | 56          | 7.4            | 71             | 5.9            | 62       | 4.4            | 56               | 27       | 6.1            | 61          | 7.8            | 80             | 7.3            | 73       | 6.4            | 70 |  |
| Retarded....     | 24       | 6.8            | 50          | 7.3            | 70             | 7.0            | 55       | 4.6            | 70               | 32       | 7.3            | 56          | 8.1            | 73             | 7.0            | 67       | 5.3            | 74 |  |
| DISTRICT GROUPS  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| Total.....       | 79       | 7.2            | 55          | 8.1            | 69             | 7.1            | 58       | 5.5            | 63               | 57       | 7.9            | 55          | 8.9            | 71             | 8.1            | 61       | 6.6            | 78 |  |
| Regulars.....    | 31       | 6.8            | 55          | 8.0            | 74             | 6.7            | 62       | 4.9            | 62               | 25       | 8.0            | 60          | 8.8            | 73             | 8.2            | 65       | 6.5            | 86 |  |
| Retarded....     | 45       | 7.6            | 55          | 8.3            | 64             | 7.4            | 55       | 6.1            | 66               | 32       | 7.8            | 50          | 9.0            | 70             | 8.0            | 60       | 6.7            | 67 |  |

## 8-MONTH GROUPS

|              |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |
|--------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|
| Total.....   | 82 | 7.0 | 54 | 8.1 | 70 | 6.9 | 61 | 4.8 | 62 | 75 | 7.2 | 68 | 8.4 | 77 | 7.4 | 68 | 6.2 | 75 |
| Regulars.... | 43 | 6.6 | 55 | 7.7 | 73 | 6.3 | 64 | 4.6 | 58 | 34 | 6.7 | 72 | 8.6 | 80 | 7.6 | 72 | 6.6 | 83 |
| Retarded...  | 36 | 7.8 | 50 | 8.7 | 68 | 7.6 | 58 | 5.3 | 66 | 40 | 7.5 | 50 | 8.3 | 73 | 7.0 | 63 | 5.8 | 68 |

## 7-7½ MONTH GROUPS

|              |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |
|--------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|
| Total.....   | 38 | 6.9 | 52 | 6.9 | 63 | 7.0 | 54 | 5.2 | 64 | 26 | 7.8 | 55 | 8.2 | 70 | 7.8 | 56 | 6.5 | 70 |
| Regulars.... | 8  | 6.8 | 53 | 8.3 | 73 | 7.3 | 60 | 5.5 | 57 | 11 | 8.0 | 53 | 8.0 | 73 | 7.0 | 60 | 6.3 | 70 |
| Retarded...  | 25 | 7.0 | 60 | 6.8 | 58 | 7.2 | 54 | 5.3 | 70 | 15 | 8.0 | 60 | 8.5 | 70 | 8.0 | 53 | 7.7 | 75 |





## 8-MONTH GROUPS

|              |    |     |    |      |    |      |    |     |    |    |      |    |      |    |      |    |      |    |
|--------------|----|-----|----|------|----|------|----|-----|----|----|------|----|------|----|------|----|------|----|
| Total.....   | 54 | 8.5 | 54 | 10.4 | 73 | 9.8  | 63 | 8.2 | 84 | 60 | 10.8 | 64 | 12.5 | 82 | 12.9 | 78 | 11.9 | 93 |
| Regulars.... | 25 | 8.1 | 50 | 10.6 | 70 | 10.3 | 63 | 9.0 | 83 | 26 | 11.2 | 65 | 14.0 | 83 | 14.0 | 80 | 12.7 | 98 |
| Retarded.... | 27 | 9.0 | 55 | 10.0 | 78 | 9.7  | 68 | 8.0 | 86 | 27 | 10.0 | 63 | 12.0 | 81 | 11.8 | 78 | 10.5 | 94 |

## 7-7½ MONTH GROUPS

|              |    |     |    |      |    |      |    |     |     |    |      |    |      |    |      |    |      |    |
|--------------|----|-----|----|------|----|------|----|-----|-----|----|------|----|------|----|------|----|------|----|
| Total.....   | 37 | 8.4 | 65 | 10.6 | 85 | 10.0 | 81 | 9.0 | 90  | 25 | 8.8  | 60 | 12.0 | 81 | 12.0 | 82 | 13.3 | 95 |
| Regulars.... | 15 | 8.6 | 68 | 11.0 | 90 | 9.0  | 83 | 9.0 | 100 | 14 | 8.4  | 58 | 12.0 | 83 | 12.0 | 90 | 13.7 | 98 |
| Retarded.... | 20 | 8.0 | 63 | 10.5 | 82 | 10.2 | 80 | 9.0 | 85  | 9  | 12.0 | 63 | 13.0 | 70 | 12.0 | 73 | 12.0 | 87 |

TABLE II.—TESTS FOR FOUR TOWNSHIPS IN HUNTINGTON COUNTY—(Continued)

| GRADE 5          |          |                |             |                |                |                |          |                |                  | GRADE 6  |                |             |                |                |                |          |                |    |  |
|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----------------|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----------------|----|--|
| Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |                | Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |                |    |  |
|                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability | Speed    | Depend-ability |                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability | Speed    | Depend-ability |    |  |
| Total.....       | 114      | 6.6            | 53          | 6.6            | 64             | 5.9            | 48       | 3.8            | 40               | 96       | 6.4            | 47          | 7.0            | 64             | 6.0            | 53       | 4.4            | 56 |  |
| Variability..... | 20       | 19             | 18          | 17             | 24             | 21             | 29       | 10             | 19               | 20       | 11             | 19          | 27             | 22             | 21             | 29       | 21             | 21 |  |
| Regulars.....    | 40       | 6.7            | 53          | 6.3            | 71             | 5.8            | 58       | 4.1            | 41               | 35       | 6.4            | 55          | 6.9            | 64             | 5.8            | 46       | 4.6            | 57 |  |
| Retarded.....    | 62       | 6.7            | 52          | 6.8            | 57             | 6.2            | 43       | 3.6            | 41               | 53       | 6.3            | 47          | 6.8            | 64             | 6.1            | 58       | 4.2            | 53 |  |
| Accelerated.     | 12       | 6.0            | 55          | 6.7            | 60             | 5.0            | 42       | 3.5            | 33               | 8        | 7.3            | 39          | 9.0            | 75             | 8.0            | 65       | 7.0            | 70 |  |
| TOTALS           |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| GRADED GROUPS    |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| Total.....       | 14       | 6.5            | 53          | 5.5            | 67             | 5.3            | 43       | 3.5            | 60               | 20       | 6.5            | 53          | 7.0            | 53             | 6.0            | 53       | 4.0            | 53 |  |
| Regulars.....    | 5        | 7.0            | 60          | 7.0            | 70             | 6.0            | 80       | 5.0            | 70               | 12       | 6.0            | 70          | 6.8            | 50             | 5.6            | 42       | 4.0            | 57 |  |
| Retarded....     | 7        | 7.0            | 50          | 5.5            | 60             | 5.0            | 33       | 3.0            | 50               | 8        | 7.3            | 50          | 7.3            | 55             | 6.7            | 60       | 4.0            | 39 |  |
| DISTRICT GROUPS  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |                |    |  |
| Total.....       | 83       | 6.4            | 52          | 6.7            | 61             | 5.8            | 47       | 3.7            | 40               | 73       | 6.5            | 47          | 7.0            | 65             | 6.1            | 53       | 4.5            | 57 |  |
| Regulars.....    | 24       | 6.5            | 42          | 6.3            | 68             | 5.8            | 50       | 3.9            | 39               | 22       | 6.5            | 50          | 7.0            | 71             | 5.8            | 45       | 4.8            | 57 |  |
| Retarded....     | 49       | 6.5            | 53          | 6.9            | 58             | 6.2            | 44       | 3.9            | 44               | 43       | 6.2            | 47          | 6.7            | 65             | 6.0            | 55       | 4.2            | 54 |  |

## 7-MONTH GROUPS

|             |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |
|-------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|
| Total.....  | 47 | 6.3 | 51 | 6.4 | 58 | 5.6 | 42 | 3.5 | 42 | 38 | 6.6 | 52 | 6.9 | 65 | 6.0 | 52 | 4.5 | 52 |
| Regulars... | 9  | 8.0 | 50 | 6.0 | 75 | 6.0 | 60 | 3.7 | 50 | 18 | 6.5 | 60 | 6.5 | 70 | 5.6 | 44 | 4.3 | 50 |
| Retarded... | 28 | 6.3 | 60 | 6.3 | 53 | 6.2 | 38 | 3.5 | 46 | 15 | 7.0 | 50 | 7.0 | 63 | 6.5 | 60 | 4.4 | 53 |

## 6-6½-MONTH GROUPS

|             |    |     |    |     |    |     |    |     |    |    |     |    |     |    |     |    |     |    |
|-------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|-----|----|-----|----|-----|----|
| Total.....  | 36 | 6.4 | 52 | 6.8 | 66 | 5.9 | 46 | 3.9 | 38 | 41 | 6.4 | 45 | 7.2 | 62 | 6.3 | 53 | 4.5 | 61 |
| Regulars... | 15 | 6.7 | 44 | 7.0 | 70 | 6.0 | 60 | 4.5 | 44 | 8  | 6.3 | 50 | 7.3 | 60 | 6.5 | 50 | 4.8 | 65 |
| Retarded... | 20 | 6.5 | 54 | 6.8 | 58 | 6.0 | 45 | 3.5 | 35 | 30 | 6.0 | 46 | 6.8 | 60 | 6.1 | 50 | 4.1 | 55 |

TABLE II.—TESTS FOR FOUR TOWNSHIPS IN HUNTINGTON COUNTY—(Continued)

| GRADE 7          |                  |          |                |             |                |                |                |          |                | GRADE 8          |          |                |             |                |                |                |          |    |  |
|------------------|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----------------|------------------|----------|----------------|-------------|----------------|----------------|----------------|----------|----|--|
|                  | Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |                | Number of Pupils | Addition |                | Subtraction |                | Multiplication |                | Division |    |  |
|                  |                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability | Speed    | Depend-ability |                  | Speed    | Depend-ability | Speed       | Depend-ability | Speed          | Depend-ability |          |    |  |
|                  |                  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |    |  |
| TOTALS           |                  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |    |  |
| Total.....       | 107              | 7.7      | 61             | 8.7         | 69             | 7.6            | 61             | 6.5      | 76             | 98               | 7.7      | 63             | 9.8         | 72             | 8.6            | 68             | 8.0      | 80 |  |
| Variability..... | 19               | 19       | 25             | 18          | 23             | 23             | 28             | 31       | 29             | .....            | 17       | 24             | 17          | 18             | 21             | 26             | 24       | 21 |  |
| Regulars.....    | 45               | 8.1      | 64             | 9.3         | 69             | 8.2            | 70             | 7.2      | 83             | 49               | 7.9      | 65             | 10.2        | 74             | 9.3            | 70             | 8.1      | 82 |  |
| Retarded.....    | 59               | 7.3      | 61             | 8.5         | 71             | 7.1            | 55             | 5.9      | 64             | 44               | 7.5      | 59             | 8.8         | 69             | 8.3            | 63             | 7.8      | 82 |  |
| Accelerated.     | 3                | 6.5      | 65             | 5.0         | 70             | 6.5            | 85             | 6.5      | 100            | 5                | 11.0     | 70             | 11.5        | 80             | 10.0           | 90             | 11.0     | 65 |  |
| GRADED GROUPS    |                  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |    |  |
| Total.....       | 19               | 7.7      | 58             | 8.0         | 64             | 7.0            | 64             | 6.3      | 83             | 18               | 7.7      | 72             | 10.2        | 78             | 9.3            | 70             | 8.5      | 80 |  |
| Regulars.....    | 9                | 7.5      | 60             | 8.0         | 67             | 7.0            | 73             | 6.5      | 83             | 8                | 7.7      | 50             | 9.5         | 83             | 9.5            | 60             | 8.0      | 70 |  |
| Retarded...      | 10               | 8.0      | 57             | 8.0         | 60             | 7.0            | 41             | 5.0      | 70             | 9                | 7.8      | 80             | 10.8        | 77             | 9.5            | 80             | 9.5      | 85 |  |
| DISTRICT GROUPS  |                  |          |                |             |                |                |                |          |                |                  |          |                |             |                |                |                |          |    |  |
| Total.....       | 83               | 7.7      | 65             | 8.7         | 71             | 7.6            | 58             | 6.6      | 72             | 76               | 7.7      | 61             | 9.9         | 69             | 8.6            | 69             | 7.8      | 81 |  |
| Regulars.....    | 33               | 8.2      | 70             | 9.4         | 70             | 8.6            | 60             | 7.8      | 83             | 39               | 7.9      | 66             | 10.6        | 73             | 9.4            | 70             | 8.2      | 82 |  |
| Retarded...      | 47               | 7.0      | 63             | 8.4         | 72             | 7.0            | 57             | 5.9      | 64             | 33               | 7.4      | 55             | 8.7         | 66             | 7.8            | 64             | 7.4      | 82 |  |



## 7-MONTH GROUPS

|              |    |     |    |      |    |     |    |     |    |    |     |    |     |    |      |    |     |    |
|--------------|----|-----|----|------|----|-----|----|-----|----|----|-----|----|-----|----|------|----|-----|----|
| Total.....   | 44 | 7.6 | 65 | 8.9  | 73 | 7.8 | 58 | 6.8 | 71 | 26 | 7.6 | 62 | 9.4 | 81 | 9.5  | 70 | 7.6 | 77 |
| Regulars.... | 20 | 7.8 | 67 | 10.0 | 70 | 8.3 | 60 | 7.3 | 81 | 16 | 7.7 | 58 | 9.8 | 78 | 10.3 | 70 | 7.6 | 75 |
| Retarded...  | 23 | 7.7 | 65 | 8.8  | 76 | 7.7 | 58 | 6.5 | 68 | 9  | 7.0 | 67 | 8.7 | 88 | 9.0  | 85 | 8.0 | 90 |

## 6-6½-MONTH GROUPS

|              |    |     |    |     |    |     |    |     |    |    |     |    |      |    |     |    |     |    |
|--------------|----|-----|----|-----|----|-----|----|-----|----|----|-----|----|------|----|-----|----|-----|----|
| Total.....   | 51 | 7.8 | 63 | 8.4 | 66 | 7.2 | 64 | 6.5 | 75 | 66 | 7.8 | 64 | 10.2 | 66 | 8.5 | 69 | 8.2 | 81 |
| Regulars.... | 20 | 8.3 | 65 | 9.2 | 65 | 8.0 | 73 | 7.5 | 83 | 29 | 8.0 | 70 | 10.5 | 70 | 9.0 | 72 | 8.3 | 83 |
| Retarded...  | 29 | 6.9 | 62 | 8.0 | 67 | 6.8 | 58 | 5.8 | 63 | 33 | 7.6 | 57 | 9.5  | 64 | 8.0 | 63 | 8.0 | 82 |

lessening of emphasis on fundamentals attendant on lengthening the term and increasing the teaching staff is more than offset by the improved gradation and specific standards that accompany supervision.

### THE ACHIEVEMENT OF THE RETARDED

A comparison of the scores of the regulars and retarded in Wabash and Huntington counties shows that in Wabash county the regulars exceed in 7 out of 13 determining cases, and in Huntington county in 14 out of 15. Following up this point,

TABLE III—COMPARISON OF PROFICIENCY IN FUNDAMENTAL PROCESSES OF ARITHMETIC WITH RETARDATION

A = Addition; S = Subtraction; M = Multiplication; D = Division.

#### WABASH COUNTY

|                                 |                        | Grade<br>5 | Grade<br>6 | Grade<br>7 | Grade<br>8 |
|---------------------------------|------------------------|------------|------------|------------|------------|
| Average Retardation<br>in Years | Shorter term group.... | 1.9        | 1.3        | 1.4        | 1.2        |
|                                 | Longer term group....  | 1.3        | 1.6        | 1.5        | 1.2        |
| Leading in Courtis<br>Tests     | Shorter term group.... | D          | A          | S M D      | A D        |
|                                 | Neither.....           | A          | S M        | A          | S M        |
|                                 | Longer term group....  | S M        | D          | .....      | .....      |

#### HUNTINGTON COUNTY

|                                 |                        |     |       |         |       |
|---------------------------------|------------------------|-----|-------|---------|-------|
| Average Retardation<br>in Years | Shorter term group.... | 1.4 | 1.5   | 1.7     | 1.5   |
|                                 | Longer term group....  | 1.4 | 1.3   | 1.4     | 1.1   |
| Leading in Courtis<br>Tests     | Shorter term group.... | A S | ..... | .....   | ..... |
|                                 | Neither.....           | M   | S     | .....   | A     |
|                                 | Longer term group....  | D   | A M D | A S M D | S M D |

Table III shows that in 2 out of 3 determining cases in Wabash county and in all 3 in Huntington county there is positive correlation between amount of retardation and lack of proficiency in the fundamental processes of arithmetic.

Considering the fact that 69 per cent of those who failed in Wabash county in 1915 eighth-grade diploma examinations, and 87 per cent of those in Huntington county fell below 60 per cent in arithmetic, is there not some evidence towards a conclusion that lack of proficiency in the fundamentals has been a cause of poor arithmetic work and thus of retardation? At least there is a relation between these in the cases studied. This may, however, be the result of factors affecting similarly the work in both general arithmetic and fundamentals.

### III. THE EFFECTS OF SIX WEEKS' DAILY DRILL IN ADDITION

By MARY A. KERR, Principal of Department School, Bloomington.

Near the last of February, 1915, in the third week of the new semester, the Courtis Test, Series B, was given thruout the Bloomington schools. The three arithmetic teachers in the Department school (which comprises all the children in grades six, seven, and eight in the city), two of whom had had no previous experience with these tests, scored all the sixth, seventh, and eighth grade papers and tabulated the results. The papers of Teacher A were scored by Teacher B, those of Teacher B by Teacher C, and those of Teacher C by Teacher A. The results were tabulated by sections and then by grades. Table I gives the median scores by half-years.

TABLE I—MEDIAN SCORES (FEBRUARY, 1915)

| Grade   | Num-<br>ber<br>in<br>Grade | ADDITION |        |                    | SUBTRACTION |        |                    | MULTIPLICATION |        |                    | DIVISION |        |                    |
|---------|----------------------------|----------|--------|--------------------|-------------|--------|--------------------|----------------|--------|--------------------|----------|--------|--------------------|
|         |                            | Attempts | Rights | Depend-<br>ability | Attempts    | Rights | Depend-<br>ability | Attempts       | Rights | Depend-<br>ability | Attempts | Rights | Depend-<br>ability |
| 6B..... | 83                         | 8.7      | 5.5    | 64                 | 8           | 5.5    | 69                 | 6.7            | 4.3    | 65                 | 6        | 4.6    | 76                 |
| 6A..... | 83                         | 9        | 5.3    | 59                 | 9.1         | 7.1    | 79                 | 7              | 4.6    | 65                 | 6.5      | 5.3    | 81                 |
| 7B..... | 63                         | 9.7      | 5.6    | 60                 | 9.7         | 7.6    | 79                 | 8              | 5      | 63                 | 7.4      | 6      | 81                 |
| 7A..... | 67                         | 9.8      | 6      | 62                 | 10.4        | 7.6    | 73                 | 8.5            | 5.5    | 65                 | 8.8      | 7.1    | 81                 |
| 8B..... | 65                         | 11.4     | 6.9    | 61                 | 11          | 8.8    | 80                 | 9              | 6      | 67                 | 9.4      | 8.2    | 87                 |
| 8A..... | 62                         | 11.5     | 6.3    | 55                 | 13          | 10.3   | 79                 | 10.1           | 6.2    | 62                 | 10.4     | 8.9    | 86                 |

The results revealed several things that needed to be remedied, but after considerable study and comparison it was felt that addition was the fundamental operation in which our children showed the least growth and dependability from grade to grade. Note that the gain in examples right from grade 6B to grade 8A is only .8 of an example. The 6A median, the lowest, is 5.3; the 8B, the highest, is 6.9; a difference of only 1.6 examples. The range in dependability is from 55 per cent to 64 per cent and lowest in grade 8A.

It was decided to try a systematic drill in addition. Each pupil was given his scores in all of the fundamental operations and under his teacher's direction compared his individual scores with those of his section, his grade, and the Courtis Standard for his grade. All this was done to reveal to him his own condition and to get him into the proper attitude to help himself.

The plan of drill decided on was as follows:

1. *Time*.—The first 5 minutes of each recitation period. The drill period covered the last 6 weeks of the semester.

2. *Stimulus*.—Accuracy.

Each day the children were started off on the drill with the instruction, "Get as many *right* answers as possible today." Teachers and pupils kept daily records of scores made. The teachers frequently advised those who seemed not to be making proper progress. They suggested to different pupils what they felt those pupils needed in order to improve. These suggestions were based on observation of the child's procedure during the drill and on the daily records kept. The children themselves were often able to locate their own peculiar difficulties and were anxious to remedy them.

3. *Examples*.—Mimeographed examples in addition beginning with 5-figure columns were used at first. The number of columns remained 3 thruout the drill, but the number of figures per column was increased one per week up to 9 figures. The number of examples for each drill exercise was 5.

As a further incentive pupils who 3 days out of 5 had 100 per cent accuracy were to come to the assembly room on Friday for a contest with all others who had attained similar scores. This requirement was raised to 4 out of 5 and of the last two weeks 5 out of 5 correctly solved.

This drill continued for 6 weeks or until the close of the year, when the Courtis Test, Series B, was again given. Table II shows the results. The 423 children in Table I who took the February test and the 6 weeks' drill are the 423 in Table II. Only those who were in for both tests and the drill are included in any of the tables.

TABLE II.—MEDIAN SCORES (JUNE, 1915)

| Grade    | Number in Grade | ADDITION |        |               | SUBTRACTION |        |               | MULTIPLICATION |        |               | DIVISION |        |               |
|----------|-----------------|----------|--------|---------------|-------------|--------|---------------|----------------|--------|---------------|----------|--------|---------------|
|          |                 | Attempts | Rights | Dependability | Attempts    | Rights | Dependability | Attempts       | Rights | Dependability | Attempts | Rights | Dependability |
| 6B.....  | 83              | 9.7      | 6.9    | 72            | 8.1         | 6      | 74            | 6.6            | 4.4    | 67            | 5.8      | 4.3    | 75            |
| 6A.....  | 83              | 10.5     | 7.5    | 71            | 9.1         | 7.2    | 79            | 7.4            | 4.7    | 64            | 6.7      | 5.4    | 81            |
| 7B.....  | 63              | 10.8     | 8.1    | 75            | 9.5         | 7.6    | 80            | 7.8            | 4.7    | 61            | 7.3      | 6.4    | 88            |
| 7A.....  | 67              | 11.8     | 8.4    | 71            | 10.1        | 7.2    | 71            | 8.7            | 5.4    | 62            | 8.8      | 7.5    | 85            |
| 8B.....  | 65              | 12.      | 9.3    | 78            | 10.8        | 8.3    | 77            | 9.4            | 6.2    | 66            | 9.2      | 8.     | 87            |
| 8A.....  | 62              | 13.7     | 10.4   | 76            | 11.9        | 9.7    | 82            | 10.2           | 6.7    | 66            | 11.1     | 9.8    | 89            |
| Total... | 423             |          |        |               |             |        |               |                |        |               |          |        |               |

The change from February to June in median scores and dependability is shown in Table III and graphically in Figure I. Note the growth from grade to grade in examples right from 6.9 in 6B grade to 10.4 in grade 8A, a gain of 3.5 examples. Note also that 6.9 was the highest score made in February and that by the 8B grade. In June 6.9 was the lowest score and was made by 6B. In accuracy all classes were above 70 per cent, and the gain from February to June ranged from 8 per cent in the 6B grade to 21 per cent in the 8A grade.

TABLE III.—MEDIAN SCORES: ADDITION (FEBRUARY AND JUNE)

|               |               | Attempts | Rights | Dependability |
|---------------|---------------|----------|--------|---------------|
| Grade 6B....  | February..... | 8.7      | 5.5    | 64            |
|               | June.....     | 9.7      | 6.9    | 72            |
| Grade 6A..... | February..... | 9        | 5.3    | 59            |
|               | June.....     | 10.5     | 7.5    | 71            |
| Grade 7B..... | February..... | 9.7      | 5.6    | 60            |
|               | June.....     | 10.8     | 8.1    | 75            |
| Grade 7A..... | February..... | 9.8      | 6      | 62            |
|               | June.....     | 11.8     | 8.4    | 71            |
| Grade 8B..... | February..... | 11.4     | 6.9    | 61            |
|               | June.....     | 12       | 9.3    | 78            |
| Grade 8A..... | February..... | 11.5     | 6.3    | 55            |
|               | June.....     | 13.7     | 10.4   | 76            |



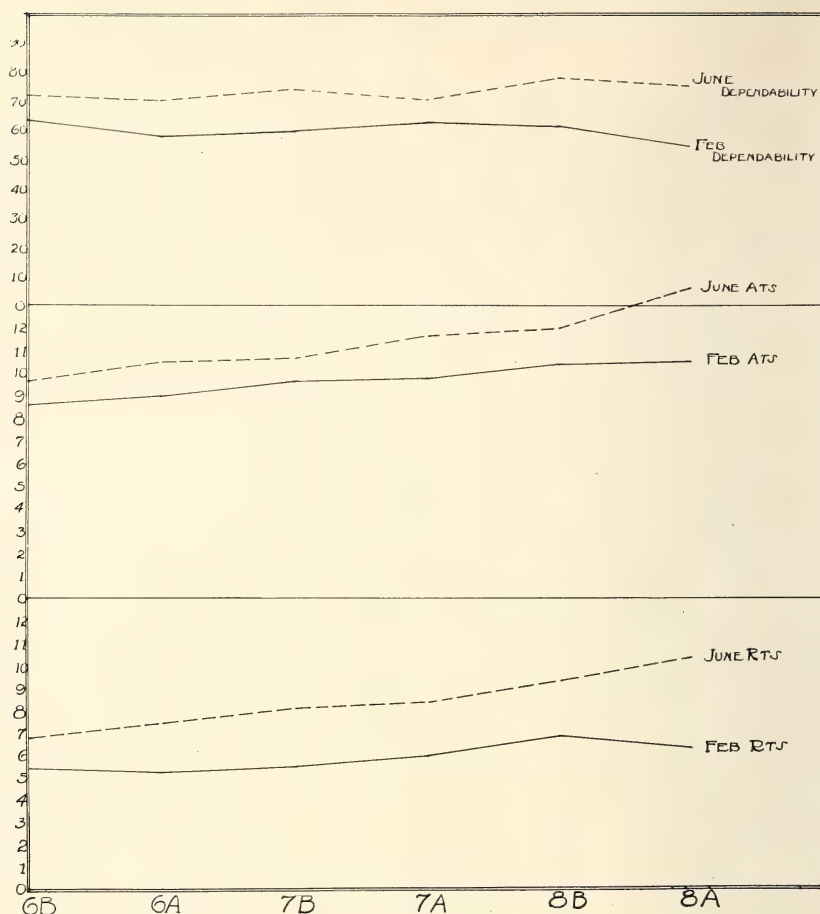


FIG. 1. SCORES IN ATTEMPTS, RIGHTS, AND DEPENDABILITY IN ADDITION FOR BOTH FEBRUARY AND JUNE.

The score on the ordinate indicates the number of problems; the symbols along the abscissa indicate the successive grades from 6B to 8A.

Together with the gain in median scores from February to June, we must consider the change in variability. If this gain has been accompanied by an increased per cent of variability its value is questionable. Table IV shows what happened. In attempts the variability in grades 6B and 7A shows no change. In grades 6A, 7B, and 8A there is less variability. In 8B there is a slightly greater variability. But note what happened in dependability.

In every grade the variability was lessened, showing that the children composing the group were much better graded in June than in February so far as this single ability is concerned.

TABLE IV.—VARIABILITY IN ADDITION, BY PER CENTS  
(FEBRUARY AND JUNE, 1915)

|               | FEBRUARY |        | JUNE     |        |
|---------------|----------|--------|----------|--------|
|               | Attempts | Rights | Attempts | Rights |
| Grade 6B..... | 22       | 27     | 22       | 20     |
| Grade 6A..... | 21       | 21     | 15       | 20     |
| Grade 7B..... | 26       | 23     | 17       | 16     |
| Grade 7A..... | 18       | 30     | 18       | 20     |
| Grade 8B..... | 21       | 28     | 22       | 17     |
| Grade 8A..... | 21       | 20     | 18       | 15     |

The range of variability in attempts and rights in the 20 Indiana cities in 1914<sup>1</sup> is presented in Table V. Bloomington's variability is included for comparison.

TABLE V.—VARIABILITY IN ADDITION: BLOOMINGTON COMPARED WITH TWENTY INDIANA CITIES (MAY, 1914)

|         | VARIABILITY IN ATTEMPTS |         |             |      | VARIABILITY IN RIGHTS |         |             |      |
|---------|-------------------------|---------|-------------|------|-----------------------|---------|-------------|------|
|         | 20 Indiana Cities       |         | Bloomington |      | 20 Indiana Cities     |         | Bloomington |      |
|         | Lowest                  | Highest | February    | June | Lowest                | Highest | February    | June |
| Grade 6 | 22                      | 31      | 6B 22       | 22   | 42                    | 68      | 6B 27       | 20   |
|         |                         |         | 6A 21       | 15   |                       |         | 6A 21       | 20   |
| Grade 7 | 22                      | 30      | 7B 26       | 17   | 35                    | 60      | 7B 23       | 16   |
|         |                         |         | 7A 18       | 18   |                       |         | 7A 30       | 20   |
| Grade 8 | 20                      | 32      | 8B 21       | 22   | 32                    | 63      | 8B 28       | 17   |
|         |                         |         | 8A 21       | 18   |                       |         | 8A 20       | 15   |

<sup>1</sup> M. E. Haggerty—*Arithmetic: A Co-operative Study in Educational Measurements (Indiana University Studies, No. 27)*.

TABLE VI.—MEDIAN SCORES IN ADDITION: BLOOMINGTON COMPARED WITH TWENTY INDIANA CITIES (MAY, 1914)

|   | Attempts | Rights | Accuracy |
|---|----------|--------|----------|
| Sixth Grade—                                  |          |        |          |
| Highest Median of Twenty Indiana Cities. .... | 8.9      | 5.6    | 65       |
| Bloomington Median, 6B. ....                  | 9.7      | 6.9    | 72       |
| Bloomington Median, 6A. ....                  | 10.5     | 7.5    | 71       |
| Seventh Grade—                                |          |        |          |
| Highest Median of Twenty Indiana Cities. .... | 9.4      | 6.4    | 68       |
| Bloomington Median, 7B. ....                  | 10.8     | 8.1    | 75       |
| Bloomington Median, 7A. ....                  | 11.8     | 8.4    | 71       |
| Eighth Grade—                                 |          |        |          |
| Highest Median of Twenty Indiana Cities. .... | 10.3     | 7.2    | 69       |
| Bloomington Median, 8B. ....                  | 12       | 9.3    | 78       |
| Bloomington Median, 8A. ....                  | 13.7     | 10.4   | 76       |

A comparison of Table V with Table VI reveals the following facts:

1. Bloomington's medians in speed, rights, and dependability are higher than the highest median of the twenty Indiana cities.
2. Bloomington's variability in speed is less in most grades and in no grade greater, while in rights in every grade the variability is lower, than any of the twenty Indiana cities.

Figure II, which is a copy of the Indiana Standard (1914), presents graphically Bloomington's position on the scale in both February and June.

Now from all of these facts and comparisons are we not justified in stating as our first conclusion that the drill had the desired effect? You must so conclude if desired effect is to be determined by higher medians and less variability.

Just here, however, we find ourselves raising several questions which seem worth answering so far at least as any of the data we have can answer them.

First, was there any transfer of increased ability in addition to the other fundamental operations? Figure III presents the conditions "before and after taking" in all of the fundamentals. At a glance, it can be seen that the drill in addition produced increased skill in addition and in addition *only*. Note that in the other operations the lines are almost coincident. We conclude, therefore, that the drill in addition did not affect skill in the other fundamental operations.

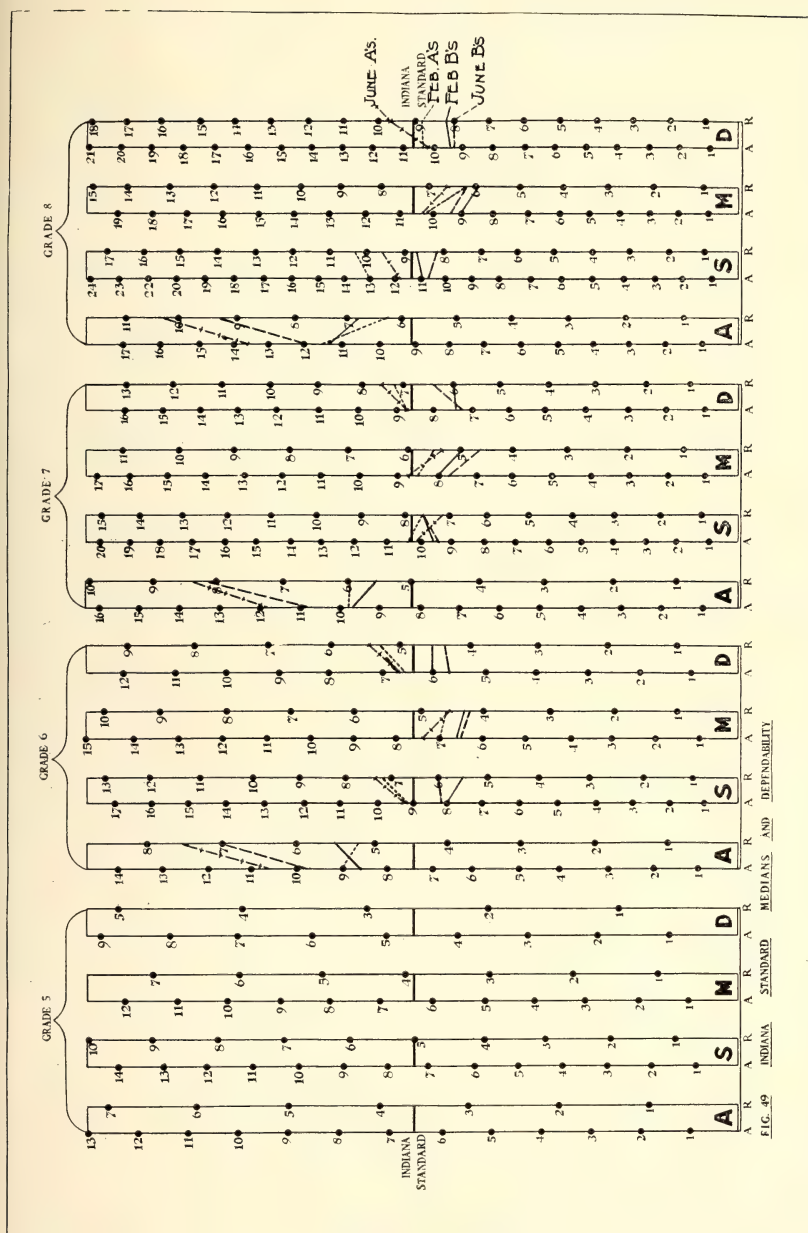


FIG. 2. THE INDIANA STANDARDS SHOWING COMPARATIVE SCORES FOR THE SEVERAL HALF-GRADES FROM 6B TO 8A. February B's represented by straight lines; February A's by dotted lines; June B's by dashed line; June A's by crossed line.

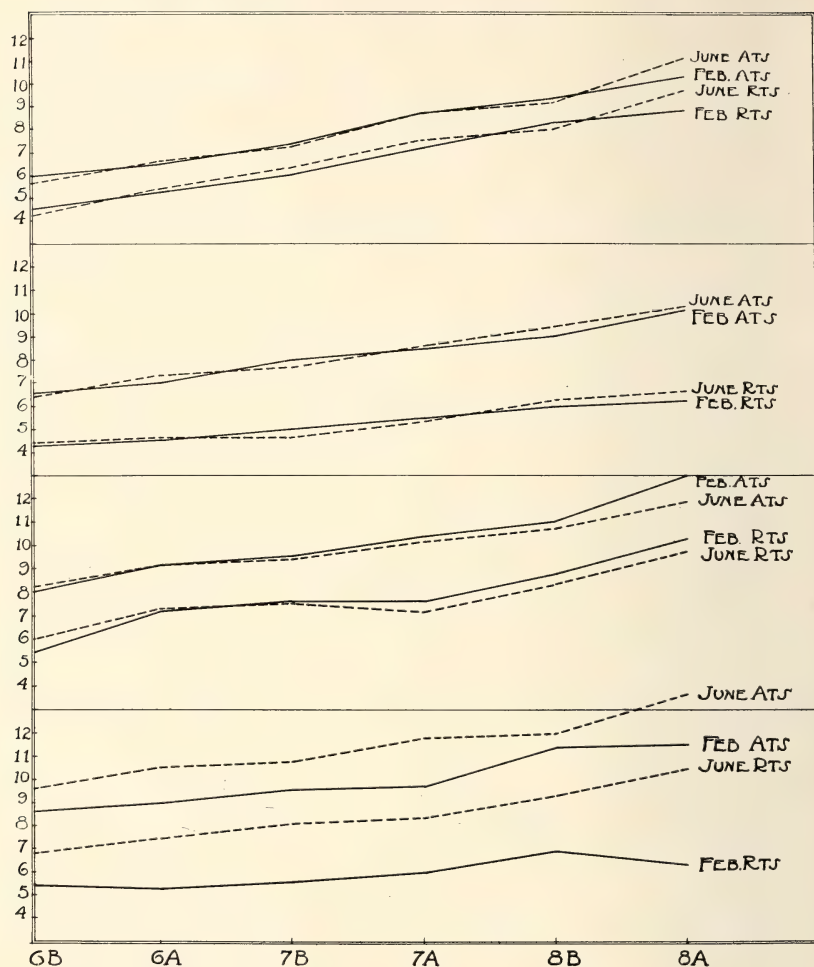


FIG. 3. SCORES IN ATTEMPTS AND RIGHTS FOR FEBRUARY AND JUNE IN ALL HALF-GRADES FROM 6B TO 8A.

The lowest quadrangle is addition; the second, subtraction; the third, multiplication; and the fourth, division.



A second question, and a very important one is, who were benefited by the drill? Was everyone? Courtis tells us that "Under existing methods of uniform training for all members of a class, the children whose natural aptitudes are in accord with the particular form of practice used, profit quickly and largely by the practice. Appropriate tests show that the number of such children does not exceed one-third of the membership of the average class and is usually much less. All the other children, however, either fail to profit by the practice or are positively injured by it.

And again, "Recent studies yield some idea of the degree of success possible under average classroom conditions. One-third of children will respond readily to any systematic training: a second third may be easily reached by the teacher able to diagnose individual needs and ingenious enough to adjust the work accordingly. The remaining third represent those heavily handicapped by nature."<sup>2</sup>

Let us see how far our results bear out the conclusions of Mr. Courtis (Table VII). If one-third of the pupils will respond readily to any systematic training, and a second third may be reached by the expert teacher, then we should have effected a desirable change in somewhat less than two-thirds of our pupils. Altho no one of the arithmetic teachers claimed to be an expert, two of them did try to discover causes of individual failures in their classes and to suggest to pupils devices for improvement. Always, the teacher's effort was to convince a pupil that he could remedy his own defects if he really wished to do so. Table VII shows that 66 per cent of the 423 gained in dependability with an average gain of 27 per cent. Thirty per cent lost in dependability with an average loss of 19 per cent, and 4 per cent made no change. Of the 15 pupils who made up this 4 per cent, 5 pupils had 100 per cent on both tests. Three were 80 per cent or above, 1 was 0 per cent, 1 was 14 per cent, 1 was 33 per cent, 2 were 50 per cent, 1 was 67 per cent, and 1 was 70 per cent. In number of examples right 70 per cent made a gain with an average of 3.6 examples, 22½ per cent lost with an average loss of 2 examples, and 7½ per cent made no change.

Are the results from such a drill as this a fair means of judging teachers? The conditions of the drill were uniform in all grades and with all the teachers. Teacher A had 132 pupils in

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<sup>2</sup>S. A. Courtis.—*Teachers' Manual for Standard Practice Tests*, p. 4.

8 sections from 6B to 8B inclusive. Teacher B had 122 pupils in 7 sections from 6B to 8A inclusive. Teacher C had 169 pupils in 8 sections from 6B to 8A inclusive. Each teacher had about the same number of weak and strong pupils. Are we justified in rating these teachers according to the results they succeeded in attaining with their pupils? I believe we are.

|                | Per cent of Pupils Making<br>Gain in Dependability and<br>Rights |         |
|----------------|--|---------|
|                | Accuracy.  | Rights. |
| Teacher A..... | 60   | 63      |
| Teacher B..... | 67   | 75      |
| Teacher C..... | 69   | 75      |

Teacher B and Teacher C, it is clear, were able to arouse about the same per cent of their pupils to make better scores and a larger per cent than Teacher A.

This finding is in perfect accord with the rating of these three teachers by Professor H. G. Childs, based on the records of three observers who, independent of each other, and at different times, visited the regular classroom work. Mr. Childs also correlated these ratings with the gross change in results obtained by the pupils of each of the teachers, from February to June. Teacher C ranked first and Teacher B a close second, but there was a wide gap between these two and Teacher A.

TABLE VII.—DEPENDABILITY: CHANGE BETWEEN FEBRUARY AND JUNE

This table shows the change in the addition scores of 423 sixth, seventh, and eighth grade pupils between February and June, in both dependability and number of examples right. The table shows in what direction change was made, gain, loss, or no change.

| GRADE      | DEPENDABILITY              |                             |                             |                           |                            |                            | EXAMPLES RIGHT          |  |  |                             |                             |                                  |                            |                            |                                |  |           |
|------------|----------------------------|-----------------------------|-----------------------------|---------------------------|----------------------------|----------------------------|-------------------------|--|--|-----------------------------|-----------------------------|----------------------------------|----------------------------|----------------------------|--------------------------------|--|-----------|
|            | Num-<br>ber<br>in<br>grade | GAIN                        |                             |                           | LOSS                       |                            |                         | NO CHANGE                                  |  |                             | GAIN                        |                                  |                            | LOSS                       |                                |  | No CHANGE |
|            |                            | Num-<br>ber<br>gain-<br>ing | Per<br>cent<br>gain-<br>ing | Total<br>points<br>gained | Num-<br>ber<br>los-<br>ing | Per<br>cent<br>los-<br>ing | Total<br>points<br>lost | Num-<br>ber<br>mak-<br>ing<br>no<br>change | Per<br>cent<br>mak-<br>ing<br>no<br>change | Num-<br>ber<br>gain-<br>ing | Per<br>cent<br>gain-<br>ing | Total<br>exam-<br>ples<br>gained | Num-<br>ber<br>los-<br>ing | Per<br>cent<br>los-<br>ing | Total<br>exam-<br>ples<br>lost | Num-<br>ber<br>mak-<br>ing<br>no<br>change |           |
| 6B.....    | 83                         | 50                          | 60                          | 1227                      | 29                         | 35                         | 676                     | 4  | 5  | 49                          | 59                          | 136                              | 24                         | 29                         | 47                             | 10   | 12        |
| 6A.....    | 83                         | 52                          | 63                          | 1405                      | 28                         | 33                         | 552                     | 3  | 4  | 56                          | 67                          | 194                              | 19                         | 23                         | 39                             | 8  | 10        |
| 7B.....    | 63                         | 43                          | 68                          | 1084                      | 18                         | 29                         | 333                     | 2  | 3  | 46                          | 73                          | 159                              | 12                         | 19                         | 29                             | 5  | 8         |
| 7A.....    | 67                         | 40                          | 60                          | 1126                      | 23                         | 34                         | 531                     | 4  | 6  | 45                          | 67                          | 178                              | 16                         | 24                         | 33                             | 6  | 9         |
| 8B.....    | 65                         | 48                          | 74                          | 1355                      | 17                         | 26                         | 245                     | .....                                      | .....                                      | 52                          | 80                          | 206                              | 13                         | 20                         | 25                             | .....                                      | .....     |
| 8A.....    | 62                         | 45                          | 73                          | 1295                      | 15                         | 24                         | 241                     | 2  | 3  | 49                          | 80                          | 207                              | 12                         | 19                         | 20                             | 1  | 1         |
| Total..... | 423                        | 278                         | 66                          | Av. 27                    | 130                        | 30                         | Av. 19                  | 15   | 4  | 297                         | 70                          | Av. 3.6                          | 96                         | 22½                        | Av. 2                          | 30   | 7½        |

TABLE VIII.—SHOWING BY WHAT THE CHANGE IN DEPENDABILITY IN ADDITION WAS ACCOMPANIED  
(FEBRUARY TO JUNE)

| GRADE         | GAIN IN DEPENDABILITY<br>Accompanied by        |      |  |       | LOSS IN DEPENDABILITY<br>Accompanied by        |       |  |      | SAME IN DEPENDABILITY<br>Accompanied by        |      |  |       | NUMBER<br>IN<br>GRADE |       |       |       |       |                          |
|---------------|--|------|--|-------|--|-------|--|------|--|------|--|-------|-----------------------|-------|-------|-------|-------|--------------------------|
|               | Gain in<br>number<br>of ex-<br>amples<br>right |      | Loss in<br>number<br>of ex-<br>amples<br>right |       | Gain in<br>number<br>of ex-<br>amples<br>right |       | Loss in<br>number<br>of ex-<br>amples<br>right |      | Gain in<br>number<br>of ex-<br>amples<br>right |      | Loss in<br>number<br>of ex-<br>amples<br>right |       |                       |       |       |       |       |                          |
|               | Boy  | Girl | Boy  | Girl  | Boy  | Girl  | Boy  | Girl | Boy  | Girl | Boy  | Girl  |                       |       |       |       |       |                          |
| Grade 6B..... | 22   | 21   | 2  | 0     | 4  | 1     | 0  | 5    | 13   | 7    | 3  | 1     | 0                     | 2     | 0     | 1     | 0     | 83                       |
| Grade 6A..... | 23   | 25   | 0  | 3     | 0  | 1     | 3  | 2    | 9  | 9    | 4  | 1     | 0                     | 0     | 0     | 1     | 1     | 83                       |
| Grade 7B..... | 21   | 19   | 0  | 0     | 1  | 2     | 2  | 1    | 5  | 8    | 1  | 1     | 2                     | 0     | ..... | ..... | ..... | 63                       |
| Grade 7A..... | 14   | 23   | 0  | 2     | 0  | 0     | 1  | 4    | 6  | 9    | 1  | 3     | 0                     | 2     | 0     | 2     | 0     | 67                       |
| Grade 8B..... | 14   | 32   | .....  | ..... | .....  | ..... | 2  | 5    | 8  | 4    | .....  | ..... | .....                 | ..... | ..... | ..... | ..... | 65                       |
| Grade 8A..... | 15   | 28   | 1  | 1     | .....  | ..... | 3  | 1    | 8  | 3    | .....  | ..... | .....                 | 0     | 1     | 0     | 1     | 62                       |
| Total.....    | 109  | 148  | 3  | 6     | 5  | 4     | 11   | 18   | 49   | 40   | 9  | 6     | 4                     | 2     | ..... | 1     | 4     | 2 423                    |
| Per cent..... | 55.6   | 65   | 1½   | 2½    | 2½   | 2     | 5½   | 8    | 25   | 17½  | 4½   | 2½    | 2                     | 1     | 1     | ½     | 2     | 1 227 girls;<br>196 boys |
| Total.....    | 257  |      | 9  |       | 9  |       | 29   |      | 89   |      | 15   |       | 6                     |       | 3     |       | 6     | 423                      |
| Per cent..... | 60   |      | 2  |       | 2  |       | 7  |      | 21   |      | 4  |       | 1.5                   |       | 1     |       | 1.5   | 100                      |

## SUMMARY OF TABLE VIII

## PART I

- Fifty-six per cent of the boys gained in dependability and in number of examples right.
- Sixty-five per cent of the girls gained in dependability and in number of examples right.
- Sixty per cent of the 423 boys and girls gained in dependability and in number of examples right.
- One and one-half per cent of the boys gained in dependability and lost in number of examples right.
- Two and one-half per cent of the girls gained in dependability and lost in number of examples right.
- Two per cent of the 423 boys and girls gained in dependability and lost in number of examples right.
- Two and one-half per cent of the boys gained in dependability and had same numbers of examples right.
- Two per cent of the girls gained in dependability and had same number of examples right.
- Two per cent of the 423 boys and girls gained in dependability and had same number of examples right.

## PART II

- Five and one-half per cent of the boys lost in dependability and gained in number of examples right.
- Eight per cent of the girls lost in dependability and gained in number of examples right.
- Seven per cent of the 423 boys and girls lost in dependability and gained in number of examples right.
- Twenty-five per cent of boys lost in dependability and lost in number of examples right.
- Seventeen and one-half per cent of girls lost in dependability and lost in examples right.
- Twenty-one per cent of the 423 boys and girls lost in dependability and lost in number of examples right.
- Four and one-half per cent of boys lost in dependability and had same number of examples right.
- Two and one-half per cent of girls lost in dependability and had same number of examples right.
- Four per cent of the 423 boys and girls lost in dependability and had same number of examples right.

## PART III

- Two per cent of boys had same dependability but gained in number of examples right.
- One per cent of girls had same dependability but gained in number of examples right.
- One and one-half per cent of the 423 boys and girls had same dependability but gained in number of examples right.



One per cent of boys had same dependability but lost in number of examples right.

One-half per cent of girls had same dependability but lost in number of examples right.

One per cent of the 423 boys and girls had same dependability but lost in number of examples right.

Two per cent of boys had same dependability and same number of examples right.

One per cent of girls had same dependability and same number of examples right.

One and one-half per cent of the 423 boys and girls had same dependability and same number of examples right.

Next we were interested in seeing what had been the effect of placing the stress on accuracy. In the summary of Table VIII we find in Part I that 60 per cent of the 423 pupils gained in dependability and in number of examples right at the same time. This is a typical case:

February score: 8 attempts; 5 rights; 62 per cent accuracy.

June score: 9 attempts; 7 rights; 77 per cent accuracy.

Two per cent gained in dependability and lost in number of examples right. For example:

February score: 8 attempts; 5 rights; 62 per cent accuracy.

June score: 6 attempts; 4 rights; 67 per cent accuracy.

Two per cent gained in dependability and had the same number of examples right. For example:

February score: 8 attempts; 5 rights; 62 per cent accuracy.

June score: 7 attempts; 5 rights; 71 per cent accuracy.

This 64 per cent of the 423 pupils, we feel safe in saying, were benefited by the drill.

In Part II of the summary we note that:

(1) Seven per cent of the 423 pupils lost in dependability but gained in number of examples right. Here is a typical score of this sort:

February score: 8 attempts; 6 rights; 75 per cent dependability.

June score: 10 attempts; 7 rights; 70 per cent dependability.

(2) Twenty-one per cent lost in dependability and in number of examples right. For example:

February score: 8 attempts; 6 rights; 75 per cent dependability.

June score: 8 attempts; 5 rights; 62 per cent dependability.

(3) Four per cent lost in dependability and had same number of examples right. For example:

February score: 8 attempts; 6 rights; 75 per cent dependability.

June score: 9 attempts; 6 rights; 67 per cent dependability.

This 32 per cent evidently were not benefited by the drill. We have not found any satisfactory explanation for all of this but we have had raised for us some interesting problems, at which we hope to work.

In this group we have such scores as this:

February: 11 attempts; 11 rights; 100 per cent dependability.  
June: 13 attempts; 10 rights; 77 per cent dependability.

Should a pupil making such score on the February test have been subjected to the drill? We think not. This score was made by a 6B girl, and showed standard ability in speed for grade seven (Courtis Standard) and 100 per cent accuracy.

Here are the scores of another 6B pupil:

February: 5 attempts; 5 rights; 100 per cent dependability.  
June: 5 attempts; 1 right; 20 per cent dependability.

Would this lad have been benefited more by a speed stimulus?

We had scores like this:

February: 3 attempts; 2 rights; 67 per cent dependability.  
June: 3 attempts; 0 rights; 0 per cent dependability.

The above is the score of a 6B boy who belongs in the class "heavily handicapped by nature."

We find many scores like this:

February: 8 attempts; 7 rights; 87 per cent dependability.  
June: 9 attempts; 7 rights; 78 per cent dependability.

Here, while the figures show a drop in dependability, we feel that the girl has not been harmed by the drill.

The fact that 60 per cent gained in dependability as they gained in speed and that 21 per cent lost in dependability as they lost in speed leads us to feel that these two stimuli are inseparably related, but in different ways for different children. We should like to know what would have been the effect on the 21 per cent if we had used the speed stimulus instead of the accuracy stimulus.

TABLE IX.—DEPENDABILITY BY QUARTILES, GRADE 6B

A DISTRIBUTION OF THE 83 6B PUPILS INTO QUARTILES, BASED ON DEPENDABILITY AS SHOWN IN THE FEBRUARY TEST, AND THE CHANGE IN DEPENDABILITY IN THESE SAME GROUPS AS SHOWN BY THE JUNE TEST.

|   | Lower<br>Quartile | Lower<br>Half | Upper<br>Quartile | Upper<br>Half |
|---|-------------------|---------------|-------------------|---------------|
| Average Dependability.... { February.....     | 19.5              | 35.5          | 89.5              | 80            |
| June.....                                     | 43                | 54.8          | 77.5              | 73.6          |
| Percent Making..... { Gain.....               | 72                | 74            | 28.5              | 44            |
| Loss.....                                     | 19                | 21            | 62.5              | 51            |
| No change.....                                | 9                 | 5             | 9                 | 5             |
| For those who made { (1) Total gains made..   | 571               | 960           | 75                | 273           |
| gains..... (2) Average gain.....              | 38                | 30            | 12.5              | 15.1          |
| For those who made { (1) Total loss made....  | 70                | 149           | 367               | 547           |
| losses..... (2) Average loss.....             | 17.5              | 21.3          | 28                | 26            |
| For those who made no change, scores were.. { | 0                 | 0             | 100               | 100           |
|   | 33                | 33            | 100               | 100           |

#### DID THE PUPILS WHO NEEDED TO GAIN PROFIT BY THIS DRILL?

Table IX is for the 6B grade and for dependability only. What is true of this grade is true of all grades. The 83 pupils were arrayed according to their dependability scores made in February test, beginning with 100 per cent and ranging down to 0. The median was determined, as well as the upper and lower quartiles. Then the score made by each pupil in June was placed just opposite his February score and the change computed. Notice what happened to the lower quartile. The average dependability of the lower quartile in February was 19.5 per cent, in June it was 43 per cent. Seventy-two per cent of the lower quartile gained in dependability with an average gain of 38 per cent each. Nineteen per cent lost in dependability with an average loss of 17.5 per cent. Nine per cent or 2 pupils made no change from February to June. The score of one was 0, of the other 33 per cent.

The pupils whose scores fell into this lower quartile were undoubtedly in greatest need of improvement. Note that 72 per cent did make an average gain of 38 per cent. The 19 per cent who lost in dependability and the 9 per cent who made no change we found were 6 boys, 2 of whom at least were "border-line" cases. The average age of the 6 boys was 13 years and 3

months, this being more than one year older than the average for the grade. The lower half shows that 74 per cent made a gain, that the average gain was 30 per cent, and that the average of the group was raised from 35.5 per cent to 54.8 per cent.

The average dependability of the upper quartile in February was 89.5 per cent and in June was 77.5 per cent. Eight and one-half per cent made a gain, 62.5 per cent lost with an average loss of 28 per cent. To the  $28\frac{1}{2}$  per cent who made a gain we may add the 9 per cent who made no change, since their scores were 100 per cent on both tests. This  $37\frac{1}{2}$  per cent were benefited by the drill, but what about the  $62\frac{1}{2}$  per cent? To many of these the loss was due to overspeeding. For example, such a score as this:

February: 7 attempts; 7 rights; dependability 100 per cent.

June: 8 attempts; 7 rights; dependability 87 per cent.

In some cases there was no change in number of attempts but a loss of one in rights. As for example:

February: 11 attempts; 10 rights; 90 per cent dependability.

June: 11 attempts; 9 rights; 82 per cent dependability.

These cases do not represent serious losses, but this can hardly be said of such a case as this:

February: 5 attempts; 5 rights; 100 per cent dependability.

June: 5 attempts; 1 right; 20 per cent dependability.

Here is a clear case of over-speeding:

February: 11 attempts; 10 rights; 91 per cent dependability.

June: 15 attempts; 10 rights; 67 per cent dependability.

We admit frankly that we do not know how to account for the losses, but have merely attempted to indicate some probable reasons for them.



# IV. AN EXPERIMENTAL STUDY OF THE EFFECTS OF DRILL IN ARITHMETICAL PROCESSES UNDER VARYING CONDITIONS

By HERMAN WIMMER, Superintendent of Schools, Rochelle, Ill.

*Introduction.*—This study of the conditions and effects of drill was made with the pupils of the fifth, sixth, seventh, and eighth grades at Bremen, Ind. These grades averaged about thirty-five pupils each, except the sixth grade, which had forty-four pupils. The sixth grade was divided for this work into two groups equal in number and apparently equal in ability. The two sections of this grade were designated as 6E and 6W.

As a measure of efficiency the Courtis Standard Test, Series A, was used. Each grade was given the first test at the beginning of the twelve weeks of work. At the end of six weeks the second test was given to all, and at the end of twelve weeks all were given the third test.

The papers of all pupils who missed any one of the three tests were discarded. All of the tests were given by the writer and all of the papers were scored by him or under his direction.

The arrangement of the drill for the several grades is shown in Table I. The time for drill was always subtracted from the regular class time devoted to arithmetic.

TABLE I.—SCHEME OF DRILL

|               | First six weeks  | Second six weeks                           |
|---------------|--|--|
| Grade 5.....  | 5 minutes daily.....   | 5 minutes daily.                           |
| Grade 6E..... | 5 minutes daily; $\frac{2}{3}$ reasoning, $\frac{1}{3}$ fundamentals.        | Same as first six weeks. Speed emphasized. |
| Grade 6W..... | 15 once per week, $\frac{2}{3}$ to reasoning, $\frac{1}{3}$ to fundamentals. | Same as 6E. Accuracy emphasized.           |
| Grade 7.....  | No drill.....  | 5 minutes daily on reasoning.              |
| Grade 8.....  | No drill.....  | 5 minutes daily on fundamentals.           |

The chief results are shown in Tables II to IV and in the more analytic tables later on. In these tables the number of problems solved is not given in any case. All figures used are per cents. These per cents are the gains made by the pupils over the grades made on the similar tests taken six weeks earlier.



All per cents are based on the average of the group considered. In part of the tables both "attempts" and "rights" are considered and tabulated separately for test six which is made up of one-step reasoning problems, test seven which is made up of longer examples in the fundamentals, and test eight in which the work is two-step reasoning. Courtis states that it is not necessary in tests one to five, inclusive, which deal with very small numbers used in the fundamental operations and the copying of figures, to compute the number of examples that are right, inasmuch as the child's ability is shown just as adequately by his speed.

TABLE II.—PER CENTS GAINED IN THE SECOND TEST BY EACH CLASS OVER THE SCORES MADE ON FIRST TEST

| Items of Test           | Grade<br>5 | Grade<br>6E | Grade<br>6W | Grade<br>7 | Grade<br>8 |
|-------------------------|------------|-------------|-------------|------------|------------|
| 1. Addition.....        | 4.7        | 10.4        | 11.6        | 11.1       | 11.2       |
| 2. Subtraction.....     | 6.6        | 25.0        | 22.8        | 11.4       | 11.1       |
| 3. Multiplication.....  | 3.1        | 11.9        | 24.5        | 12.1       | 10.9       |
| 4. Division.....        | 53.4       | 25.0        | 54.9        | 11.4       | 11.1       |
| 5. Copying figures..... | 36.9       | 20.4        | 43.3        | 11.1       | 10.8       |
| 6. { Attempts.....      | -1.0       | 43.3        | 48.2        | 12.1       | 12.1       |
| { Rights.....           | 48.6       | 82.2        | 72.0        | 16.3       | 13.5       |
| 7. { Attempts.....      | 12.9       | 11.9        | 5.0         | 11.2       | 10.6       |
| { Rights.....           | 3.9        | 3.8         | 13.0        | 11.3       | 12.0       |
| 8. { Attempts.....      | 42.2       | 74.6        | 81.6        | 17.8       | 16.8       |
| { Rights.....           | 3.8        | 68.6        | 132.1       | 16.6       | 95.0       |

TABLE III.—GAIN IN PER CENTS SHOWN BY AVERAGES OF SCORES MADE IN THIRD SERIES OF TESTS OVER AVERAGES MADE IN SECOND SERIES

| Items of Test           | Grade<br>6E | Grade<br>6W | Grade<br>7 | Grade<br>8 |
|-------------------------|-------------|-------------|------------|------------|
| 1. Addition.....        | 9.3         | 3.7         | 1.7        | 11.5       |
| 2. Subtraction.....     | 14.9        | 6.2         | 3.2        | 11.7       |
| 3. Multiplication.....  | 8.4         | 18.2        | -2.6       | 14.4       |
| 4. Division.....        | 18.4        | 7.4         | 7.4        | 15.5       |
| 5. Copying figures..... | — .8        | .0          | -3.9       | 17.2       |
| 6. { Attempts.....      | 20.7        | 22.6        | 18.3       | 6.0        |
| { Rights.....           | 18.8        | 16.0        | 25.3       | 3.5        |
| 7. { Attempts.....      | 6.6         | 2.7         | 2.7        | 8.5        |
| { Rights.....           | 19.6        | 3.3         | 15.4       | 18.4       |
| 8. { Attempts.....      | 1.4         | 11.7        | 20.0       | -5.6       |
| { Rights.....           | 5.1         | 5.1         | 12.8       | -5.1       |

TABLE IV.—AVERAGE GAINS MADE IN SECOND TESTS OVER FIRST (UPPER LINES OF FIGURES). GAINS MADE IN THIRD SERIES OVER SCORES MADE IN SECOND SERIES (LOWER LINES)

|   | Grade<br>5 | Grade<br>6E | Grade<br>6W | Grade<br>7 | Grade<br>8 |
|---|------------|-------------|-------------|------------|------------|
| All tests, 1-8 inclusive.....                                 | 19.6       | 34.3        | 45.1        | 12.9       | 19.5       |
|   | .....      | 11.1        | 8.8         | 9.1        | 8.6        |
| Fundamentals: 1, 2, 3, 4, 7 rights,<br>and 7 attempts.....    | 14.1       | 14.7        | 18.1        | 11.4       | 11.1       |
|   | .....      | 12.9        | 6.9         | 4.7        | 13.3       |
| Reasoning: 6 attempts, 6 rights; 7<br>attempts, 7 rights..... | 23.4       | 67.2        | 83.5        | 15.7       | 34.6       |
|   | .....      | 11.5        | 13.8        | 18.6       | — .4       |
| Reasonings: 6 rights and 8 rights<br>only.....                | 26.2       | 75.9        | 102.1       | 16.5       | 54.2       |
|   | .....      | 11.9        | 10.6        | 19.1       | — .8       |

TABLE V.—NORMAL GROWTH OF SIX WEEKS WITHOUT DRILL, GRADES 7, 8

|                                      | Grade 7 | Grade 8 |
|--------------------------------------|---------|---------|
| All tests .....                      | 12.9    | 19.5    |
| Fundamentals.....                    | 11.4    | 11.1    |
| Reasoning, attempts and rights ..... | 15.7    | 34.6    |
| Reasoning, rights only .....         | 16.5    | 54.2    |

*Normal Growth without Drill during Six Weeks.*—Table V shows the results in grades 7 and 8 where during the first six weeks there was no drill. These pupils generally did not know that they were to be given a second and third series of tests and so were not preparing to make better grades. The table shows that the average of the two gains made by these grades on the whole series of eight kinds of problems was 16.233 per cent. In fundamentals both grades made approximately the same gain, but in reasoning grade 8 far surpassed the grade 7. The average for both grades in reasoning, taking into consideration correct answers only, was 35.36 per cent.

The normal growth for the six weeks is probably not nearly so large as the figures would indicate. The reason why the pupils were able to increase their grades so much was that at the second series of tests they knew just what kind of work to expect in each

test and were better able to use all of their ability in making a good showing. By examining Table IV it is seen that the pupils of all grades and in all kinds of work almost without exception made a greater gain in the second series of tests over their previous work than they were able to make on the third series over the second. This was on account of the condition just mentioned.

The proper way to arrive at a proper answer to this problem would be to give a class three sets of tests without drill at any time and see what growth was shown between the second and third tests. A little light, perhaps, is thrown on this by Table IV, where we find that during the second six weeks while the grade 7 pupils were practicing on reasoning exclusively they made a gain of 4.66 per cent on fundamentals, while during the same period when grade 8 pupils were practicing on fundamentals they seemed to have made no growth at all in reasoning.

*Comparative Progress with Drill and without.*—Table VI gives an unequivocal answer to the question as to whether drill is worth while. The smallest difference in averages was shown in fundamentals where the fifth and sixth grades, who had drill during the first six weeks, were able to excel themselves by only 4.356 per cent more than the seventh and eighth grade pupils who were being given no drill. In all other cases the gain is large. In reasoning where correct answers only are considered, the difference in gain in favor of those groups that took regular drill is 32.7 per cent. Evidently it pays to give regular drill work in arithmetic.

TABLE VI.—COMPARATIVE PROGRESS WITH AND WITHOUT DRILL. FIGURES BASED ON GAINS MADE IN SECOND TEST OVER FIRST

|  | Grades 5, 6 | Grades 7, 8 | Difference<br>in favor of<br>Drill |
|--|-------------|-------------|------------------------------------|
|  | Drill       | No drill    |                                    |
| All tests, attempts and rights (see Table I) | 33.3        | 16.2        | 17.1                               |
| Fundamentals.....                            | 15.6        | 11.3        | 4.4                                |
| Reasoning, attempts and rights.....          | 58.0        | 25.1        | 32.9                               |
| Reasoning, rights only.....                  | 68.1        | 35.4        | 32.7                               |

*Comparison of Progress with Drill on Fundamentals and Progress with Drill on Reasoning.*—From Table VII it seems that about the same progress was made by the two groups, the group that had a drill daily in fundamentals and the group that had the

same amount of drill in reasoning. However, it is very interesting to see along what lines each gained. Those who had drilled in reasoning made a large gain in reasoning, while the group that had practiced fundamentals exclusively made a slight loss in reasoning. The group that had practiced fundamentals made a gain of 13.34 per cent over their former record in fundamentals, while the group which had drilled on reasoning made a gain of only 4.66 per cent in fundamentals.

Practice in reasoning gives somewhat larger gains than practice in fundamentals only.

These figures seem to show clearly that we get in arithmetic what we drill for. The most profitable form of drill seems to be one in which part of the time is devoted to reasoning and part to fundamentals.

TABLE VII.—PROGRESS WITH DRILL ON REASONING COMPARED WITH DRILL ON FUNDAMENTALS IN SECOND SIX WEEKS

No drill in first 6 weeks. During the second 6 weeks, grade 7 was given 5 minutes daily drill in reasoning; grade 8 had 5 minutes daily drill in fundamentals.

|                                     | Grade 7 | Grade 8 |
|-------------------------------------|---------|---------|
| All tests.....                      | 9.1     | 8.6     |
| Fundamentals.....                   | 4.7     | 13.3    |
| Reasoning, attempts and rights..... | 18.6    | .4      |
| Reasoning, rights only.....         | 19.1    | .8      |

*Drill for Speed and Drill for Accuracy.*—The difference in progress made by the two groups, one being drilled for accuracy and the other for speed, is not very large. As the results are grouped in Table VIII, the speed group is shown to have made the greater gain in fundamentals, in reasoning when correct answers only are considered, and in the average of all tests.

The only group of tests on which the accuracy pupils excelled was in reasoning problems where both attempts and rights are considered.

By referring to Table III, it is seen that a large gain was made in Test No. 7 by the pupils who were practicing for speed (Grade 6E). Test No. 7 is made up of problems in addition, subtraction, multiplication, and division in which large numbers are used.

As the greater gain in nearly all cases is with the pupils



who practiced for speed, it would seem that this form of practice is preferable. I believe that speed generally takes accuracy along with it and that the pupil who is speediest in the manipulation of figures makes the fewest mistakes.

TABLE VIII.—COMPARISON WITH DRILL FOR SPEED AND DRILL FOR ACCURACY (SECOND 6 WEEKS)

|                             | Grade 6E<br>(Drilled for<br>speed) | Grade 6W<br>(Drilled for<br>accuracy) | Difference<br>in favor of<br>speed section |
|-----------------------------|------------------------------------|---------------------------------------|--|
| All tests.....              | 11.1                               | 8.8                                   | 2.3  |
| Fundamentals.....           | 12.9                               | 6.9                                   | 6.0  |
| Reasoning, rights only..... | 11.9                               | 10.6                                  | 1.3  |

*The Best Distribution of Time for Drills.*—Tables IX shows that the better progress in every group of tests was in favor of the pupils who were given one fifteen-minute drill once per week over the pupils who were given a five-minute drill five times per week.

Fifteen minutes once per week seems much better than five minutes per day for drill work. Much better results were attained; there was a saving of time, not only the ten minutes difference per week, but a saving of time that was lost in taking up and laying aside a special drill each day; there was also a saving of energy on the part of the teacher in preparing for and administering one drill rather than five per week.

The biggest difference was in reasoning. This is perhaps explained when we consider that not much could be done in training for reasoning in drills only five minutes in length, especially when each was taken partially for reasoning and partially for fundamentals.

TABLE IX.—DISTRIBUTION OF TIME OF DRILLS IN GRADE 6 (FIRST 6 WEEKS)

|                                     | Grade 6E<br>(5 minutes<br>daily) | Grade 6W<br>(15 minutes<br>once per<br>week) | Difference in<br>favor of 15<br>minutes once<br>per week |
|-------------------------------------|----------------------------------|--|--|
| All tests.....                      | 34.3                             | 45.1   | 10.8   |
| Fundamentals.....                   | 14.7                             | 18.1   | 3.4  |
| Reasoning, attempts and rights..... | 67.2                             | 83.5   | 16.3   |
| Reasoning, rights only.....         | 75.9                             | 102.1  | 26.2   |



*Comparison of the First Six Weeks' Gain under Drill in Each Grade.*—Grade 6W pupils who had fifteen minutes of drill once per week made the greatest gains in all tests. The figures of Table X do not show the real gain so far as a comparison of the seventh and eighth with the fifth and sixth grades goes. This tabulation is unfair to the two upper grades. The reason is this: In all grades, regardless of the kind of drill or whether they had drill, greater gains were shown on the second test than on the third. The reason for this is that the pupils knew so much better how to go about the work in the second test than in the first that they were able to make great gains. The third test found them not much better acquainted with the nature of the tests than they were the second time, and they were thus not able to make such great gains. In Table X, the gains shown for the fifth and sixth grades are for the second test, while the gains of the seventh and eighth grades are for the third test.

The fifth grade pupils were at a great disadvantage in each series of tests in those parts in which reasoning was required, not so much on account of the reasoning required but on account of the difficulty which they encountered in reading the problems, or at least in reading them rapidly. Too large a proportion of their time was consumed in the work of reading the problems. The child's ability to read is put to the test in sets six and eight of each series quite as well as his ability to reason.

It seems that our sixth grade pupils made more progress on account of drill work than the other grades. Whether this would be true with other groups of pupils and other teachers in charge, I am unable to say. There was a smaller proportion of pupils in the sixth grade who were not doing passing work than in any other grade tested. This would have a tendency to skew the results. I believe that no adequate conclusion can be formed from these tests as to which grades will profit most from drill work.

TABLE X.—COMPARISON OF THE FIRST SIX WEEKS' GAIN UNDER DRILL, GRADES 5 TO 8

Figures show the gains of grades 5-6 during first six weeks and grades 7-8 during second six weeks. The seventh and eighth grades had no drill work between the first and second tests.

|                                     | Grade<br>5 | Grade<br>6E | Grade<br>6W | Grade<br>7 | Grade<br>8 |
|-------------------------------------|------------|-------------|-------------|------------|------------|
| All tests.....                      | 19.5       | 34.3        | 45.1        | 9.1        | 8.6        |
| Fundamentals.....                   | 14.1       | 14.7        | 18.1        | 4.7        | 13.3       |
| Reasoning, attempts and rights..... | 23.4       | 67.2        | 83.5        | 18.6       | — .4       |
| Reasoning, rights only.....         | 26.2       | 75.9        | 102.1       | 19.1       | — .8       |

## V. EXPERIMENTS WITH COURTIS PRACTICE PADS

By FLORA WILBER, Principal of Fort Wayne Training School.

*Nature of the Study.*—This paper reports an investigation of the value of such individual daily practice as is afforded by the Courtis Standard Practice Pads, where the drill to be given is determined by the individual needs of the members of the class. In order to test the results of the practice, Series B of the Courtis Tests was given in September, 1914, to the fifth and sixth grades in the training department of the Fort Wayne City Normal School. On the basis of these tests the beginning section of each grade was divided into two equal groups. As no two pupils equal in each test in both “attempts” and “rights” could be found, the standing of each pupil was determined by finding the average of his attempts and rights in the four fundamental operations. Of two pupils having such equal scores, one was put into each group. Thus the individual scores were as nearly equal as possible, and the combined scores of the groups were not more than one example apart.

TABLE I.—AVERAGE OF ATTEMPTS AND RIGHTS FOR FOUR FUNDAMENTAL OPERATIONS FOR 28 PUPILS

| GRADE 5       |          | GRADE 6 |          |
|---------------|----------|---------|----------|
| Group I       | Group II | Group I | Group II |
| 3.5           | 3.5      | 6.5     | 6.875    |
| 2.75          | 2.75     | 6.0     | 5.75     |
| 2.625         | 2.625    | 5.5     | 5.75     |
| 1.875         | 1.875    | 5.375   | 5.375    |
| 2.5           | 2.25     | 4.25    | 4.25     |
| 2.25          | 1.625    | 4.125   | 4.       |
| 3.625         | 4.5      | 2.5     | 3.125    |
| Totals 19.125 | 19.125   | 34.25   | 35.125   |

The fifth grade group gave  $4\frac{3}{4}$  minutes of the daily period devoted to arithmetic to this practice and the sixth grade group gave 4 minutes. The other group in each grade used the full period for regular work. Except for the time given to the practice, both groups were taught together.



|                                     |               |     |     |      |     |     |     |     |     |      |     |      |     |     |     |      |     |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |
|-------------------------------------|---------------|-----|-----|------|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| GRADE 6<br><br>Individual Pupils... | 9             | 13  | 11  | 17   | 6   | 9   | 7   | 15  | 9   | 16   | 10  | 19   | 8   | 13  | 8   | 17   | 7   | 10  | 7   | 14   | 4   | 8   | 5   | 8   | 6   | 13  | 6   | 12  | 3   | 13  | 1   | 11  |
|                                     | 6             | 9   | 8   | 14   | 4   | 5   | 5   | 14  | 10  | 10   | 10  | 11   | 9   | 8   | 8   | 11   | 7   | 10  | 6   | 10   | 4   | 8   | 3   | 7   | 6   | 7   | 4   | 15  | 2   | 5   | 2   | 13  |
|                                     | 6             | 11  | 9   | 11   | 1   | 4   | 4   | 4   | 9   | 12   | 11  | 16   | 6   | 9   | 5   | 11   | 7   | 8   | 8   | 13   | 3   | 4   | 2   | 10  | 7   | 13  | 4   | 8   | 5   | 12  | 3   | 4   |
|                                     | 6             | 8   | 9   | 13   | 6   | 7   | 4   | 10  | 10  | 12   | 9   | 16   | 8   | 12  | 5   | 11   | 5   | 9   | 5   | 10   | 4   | 6   | 2   | 7   | 3   | 5   | 5   | 15  | 1   | 3   | 4   | 15  |
|                                     | 4             | 8   | 7   | 10   | 2   | 5   | 4   | 6   | 9   | 11   | 9   | 12   | 7   | 8   | 4   | 8    | 4   | 7   | 6   | 10   | 2   | 6   | 1   | 4   | 4   | 9   | 3   | 8   | 2   | 6   | 0   | 7   |
|                                     | 8             | 8   | 4   | 12   | 0   | 2   | 0   | 5   | 8   | 9    | 9   | 14   | 4   | 5   | 3   | 8    | 5   | 9   | 5   | 10   | 1   | 4   | 1   | 2   | 4   | 7   | 6   | 7   | 2   | 4   | 4   | 5   |
|                                     | 5             | 6   | 7   | 11   | 1   | 4   | 2   | 5   | 6   | 8    | 7   | 9    | 2   | 3   | 3   | 8    | 4   | 6   | 3   | 8    | 0   | 2   | 0   | 3   | 3   | 4   | 3   | 6   | 0   | 0   | 0   | 1   |
|                                     | 6.7           | 8.8 | 8.5 | 12.5 | 2.5 | 5.8 | 4.5 | 6.5 | 9.5 | 11.5 | 9.5 | 14.5 | 7.5 | 8.5 | 6.3 | 11.2 | 5.8 | 9.3 | 6.3 | 10.8 | 3.5 | 6.3 | 2.3 | 7.3 | 4.8 | 7.8 | 4.8 | 8.8 | 2.8 | 5.5 | 2.5 | 7.5 |
|                                     | Medians ..... |     |     |      |     |     |     |     |     |      |     |      |     |     |     |      |     |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |
|                                     | Totals .....  |     |     |      |     |     |     |     |     |      |     |      |     |     |     |      |     |     |     |      |     |     |     |     |     |     |     |     |     |     |     |     |
|                                     | 44            | 63  | 55  | 58   | 20  | 36  | 26  | 59  | 61  | 78   | 65  | 97   | 44  | 58  | 36  | 74   | 39  | 59  | 40  | 75   | 18  | 38  | 14  | 41  | 33  | 58  | 31  | 71  | 15  | 43  | 14  | 56  |

In May Series B was given a second time. The results have been computed from the differences between the scores of the two tests. They can be used as suggestive only, inasmuch as before school closed the number of pupils remaining in each group (7) was much too small for positive conclusions.

*Speed.*—In Table II are found the scores in attempts and rights for each pupil in each operation together with the group scores, which are the totals of the individual scores, and the group medians. Using the group scores as the basis of computation, Table III gives the per cent of gain made during the year by each group and the difference in gains by practiced and unpracticed groups.

TABLE III.—PER CENT OF GAIN (IN MAY OVER SEPTEMBER)  
IN SPEED OF PRACTICED AND UNPRACTICED GROUPS

|                     | Unpracticed | Practiced | Gain of Practiced over Unpracticed |
|---------------------|-------------|-----------|------------------------------------|
| GRADE 5             |             |           |                                    |
| Addition.....       | 30          | 43        | 13                                 |
| Subtraction.....    | 27          | 54        | 27                                 |
| Multiplication..... | 12          | 148       | 136                                |
| Division.....       | 0           | 144       | 144                                |
| GRADE 6             |             |           |                                    |
| Addition.....       | 43          | 60        | 17                                 |
| Subtraction.....    | 28          | 49        | 21                                 |
| Multiplication..... | 51          | 88        | 37                                 |
| Division.....       | 76          | 129       | 53                                 |

Thus the speed gain made in addition during the year by the fifth grade unpracticed group is 30 per cent, while the practiced group gained 43 per cent. In the sixth grade the unpracticed group made a gain of 43 per cent and the practiced group 60 per cent. Comparing the gain made by the practiced group over the unpracticed, it is found in grade 5 to be 13 per cent in addition, 27 per cent in subtraction, 136 per cent in multiplication, and 144 per cent in division. In the sixth grade it is 17 per cent in addition, 21 per cent in subtraction, 37 per cent in multiplication, and 53 per cent in division. The gain in speed in the fifth grade is particularly noticeable, and varies greatly. The sixth grade gains do not vary so much. The greatest gain in both grades is in multiplication and division.



*Accuracy.*—Table IV shows in a similar way the gain made by each group in May in accuracy. Thus the unpracticed group in the fifth grade gained 30 per cent in addition and the practiced group 37 per cent, making a gain for the practiced over the unpracticed of 7 per cent. In subtraction this gain was 20 per cent, in multiplication 5 per cent, while in division the practiced group fell 1 per cent below the unpracticed group. In the sixth grade the gain of the practiced over the unpracticed is in addition 8 per cent, in subtraction 19 per cent, in multiplication 2 per cent, and in division 6 per cent. The greatest gain in accuracy is in subtraction. The gains in both grades are much the same in each operation except in division, where the practiced group's gain over the unpracticed is 7 per cent greater than the corresponding gain in the fifth grade.

TABLE IV.—ACCURACY PER CENT OF GAIN (IN MAY OVER SEPTEMBER) IN ACCURACY OF PRACTICED AND UNPRACTICED GROUPS

|                     | Unpracticed | Practiced | Of Practiced<br>over<br>Unpracticed |
|---------------------|-------------|-----------|-------------------------------------|
| GRADE 5             |             |           |                                     |
| Addition.....       | 30          | 37        | 7                                   |
| Subtraction.....    | 29          | 49        | 20                                  |
| Multiplication..... | 26          | 31        | 5                                   |
| Division.....       | 43          | 42        | —1                                  |
| GRADE 6             |             |           |                                     |
| Addition.....       | 12          | 20        | 8                                   |
| Subtraction.....    | 2           | 21        | 19                                  |
| Multiplication..... | 18          | 20        | 2                                   |
| Division.....       | 28          | 34        | 6                                   |

Tables V and VI give the medians for each group in attempts and rights together with the gain of each and the gain of the practiced over the unpracticed.

TABLE V.—MEDIAN ATTEMPTS (IN MAY AND SEPTEMBER) OF PRACTICED AND UNPRACTICED GROUPS

|                    | UNPRACTICED    |      | PRACTICED      |      | GAIN MADE BY          |                | Gain of<br>Prac-<br>ticed<br>over Un-<br>prac-<br>ticed |
|--------------------|----------------|------|----------------|------|-----------------------|----------------|---|
|                    | Septem-<br>ber | May  | Septem-<br>ber | May  | Un-<br>prac-<br>ticed | Prac-<br>ticed |   |
| GRADE 5            |                |      |                |      |                       |                |   |
| Addition.....      | 5.5            | 6.5  | 6.3            | 8.6  | 1                     | 2.3            | 1.3   |
| Subtraction.....   | 5.8            | 7.4  | 5.8            | 8.9  | 1.6                   | 3.             | 1.4   |
| Multiplication.... | 4.3            | 4.8  | 3.2            | 7.5  | .5                    | 4.3            | 3.8   |
| Division.....      | 3.3            | 3.5  | 2.5            | 5.7  | .2                    | 3.2            | 3.  |
| GRADE 6            |                |      |                |      |                       |                |   |
| Addition.....      | 6.7            | 8.8  | 8.5            | 12.5 | 1.1                   | 4.             | 2.9   |
| Subtraction.....   | 9.5            | 11.5 | 9.5            | 14.5 | 2.                    | 5.             | 3.  |
| Multiplication.... | 5.8            | 9.3  | 6.3            | 10.8 | 3.5                   | 4.5            | 1.  |
| Division.....      | 4.8            | 7.8  | 4.8            | 8.8  | 3.                    | 4.             | 1.  |

TABLE VI.—MEDIAN RIGHTS (IN MAY AND SEPTEMBER) OF PRACTICED AND UNPRACTICED GROUPS

|                    | UNPRACTICED |     | PRACTICED |      | GAIN MADE BY |           | Gain of Practiced over Unpracticed |
|--------------------|-------------|-----|-----------|------|--------------|-----------|------------------------------------|
|                    | September   | May | September | May  | Unpracticed  | Practiced |                                    |
| GRADE 5            |             |     |           |      |              |           |                                    |
| Addition.....      | 1.5         | 4.3 | 1.8       | 6.5  | 2.8          | 4.7       | 1.9                                |
| Subtraction.....   | 2.5         | 5.5 | 2.3       | 6.8  | 3.           | 4.5       | 2.5                                |
| Multiplication.... | .5          | 2.3 | 1.5       | 5.8  | 1.8          | 4.3       | 2.5                                |
| Division.....      | 0           | 2.3 | .5        | 3.5  | 2.3          | 3.        | .7                                 |
| GRADE 6            |             |     |           |      |              |           |                                    |
| Addition.....      | 2.5         | 5.8 | 4.5       | 6.5  | 3.3          | 2.        | —1.3                               |
| Subtraction.....   | 7.5         | 8.5 | 6.3       | 11.2 | 1.           | 4.9       | 3.9                                |
| Multiplication.... | 3.5         | 6.3 | 2.3       | 7.3  | 2.8          | 5.0       | 2.2                                |
| Division.....      | 2.8         | 5.5 | 2.5       | 7.5  | 2.7          | 5.0       | 2.3                                |

*Comparison of Speed and Accuracy.*—That the practice did not train in speed at the expense of accuracy is shown by a comparison of the May medians of the practiced group with the Indiana medians in attempts and rights (*Indiana University Bulletin*, Vol. XII, No. 18). Table VII shows the per cent of superiority of the practiced groups over the Indiana median in attempts and rights. This superiority is greater in rights than it is in attempts, being especially marked in the fifth grade. Only at one place—sixth grade addition—is the superiority in attempts higher.

A study of Table VIII showing the Indiana medians of dependability and that of the practiced groups in May gives similar results.

TABLE VII.—COMPARISON OF INDIANA AND PRACTICED GROUP MEDIANS

|                    | ATTEMPTS          |                          |                                 | RIGHTS            |                          |                                 | Excess of su-<br>periority<br>in<br>rights<br>over<br>at-<br>tempts |
|--------------------|-------------------|--------------------------|---------------------------------|-------------------|--------------------------|---------------------------------|---|
|                    | Indiana<br>Median | Prac-<br>ticed<br>Median | Per<br>Cent<br>Su-<br>periority | Indiana<br>Median | Prac-<br>ticed<br>Median | Per<br>Cent<br>Su-<br>periority |   |
| GRADE 5            |                   |                          |                                 |                   |                          |                                 |   |
| Addition.....      | 6.6               | 8.6                      | 30                              | 3.6               | 6.5                      | 81                              | 51  |
| Subtraction.....   | 7.3               | 8.8                      | 21                              | 5.                | 6.8                      | 36                              | 15  |
| Multiplication.... | 6.3               | 7.5                      | 19                              | 3.9               | 5.8                      | 49                              | 30  |
| Division.....      | 4.5               | 5.7                      | 27                              | 2.6               | 3.5                      | 35                              | 8   |
| GRADE 6            |                   |                          |                                 |                   |                          |                                 |   |
| Addition.....      | 7.4               | 12.5                     | 69                              | 4.4               | 6.5                      | 48                              | —21   |
| Subtraction.....   | 8.9               | 14.5                     | 63                              | 6.5               | 11.2                     | 72                              | 9   |
| Division.....      | 5.7               | 8.8                      | 54                              | 4.8               | 7.5                      | 56                              | 2   |

TABLE VIII.—COMPARISON OF DEPENDABILITY BETWEEN INDIANA AND PRACTICED GROUPS

|                     | GRADE 5        |                        | GRADE 6        |                        |
|---------------------|----------------|------------------------|----------------|------------------------|
|                     | Indiana Median | Practiced Group Median | Indiana Median | Practiced Group Median |
| Addition.....       | 55             | 72                     | 59             | 67                     |
| Subtraction.....    | 68             | 77                     | 73             | 76                     |
| Multiplication..... | 61             | 69                     | 67             | 55                     |
| Division.....       | 57             | 67                     | 74             | 79                     |

*Summary.*—On the basis of group scores and medians each group made a considerable gain in each operation.

The gain of the practiced group was the greater in each operation except in fifth grade division. This lack of gain may bear a relation to the general lack of dependability in division in the fifth grade as shown in the report of the twenty cities of Indiana to which reference has already been made.

In speed the gain is considerable, and there is a clear tho not large gain in accuracy.

The gains made by practice vary greatly in the four operations both by individuals and by grades.

The experiment gives encouragement to the idea that such practice as can be given to individual pupils upon the fundamental arithmetical operations in accordance with individual needs is justified. However, this experiment cannot be conclusive on account of the small number of pupils engaged.

# INDIANA UNIVERSITY STUDIES



Study No. 33

STATE SUPERVISION AND ADMINISTRATION OF  
CHARITIES. By FREDERIC HOWLAND GUILD, A.M.





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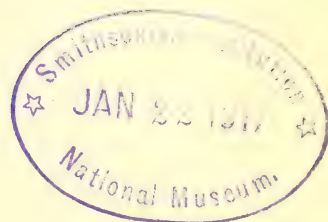
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## Prefatory Note

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The problem of efficient administration of State charitable, penal, and insane institutions, and of effective supervision of State, local, and private institutions, has long been a serious one in the United States. It is only in recent years, however, with the rise of the efficiency and economy movement and its agitation for the reorganization of State systems, that the attention of students of government and of the average citizen has been directed to the present confusion existing in this particular field and to the need of a better understanding of the systems by which the various States attempt to meet the problem.

The occasion for this study grew out of the situation in Rhode Island in 1913. In 1912 a Board of Control and Supply with fiscal powers was superimposed upon a Board of State Charities and Corrections which was exercising general administrative control over most of the State institutions. From the outset the system was unsatisfactory, and in 1913-14 the Rhode Island Legislative Reference Bureau began an investigation of the systems in other States, of which this study is the result. In 1915 the study was revised, with material changes, particularly in the treatment of the "dual system" and the conclusions, and was submitted as a thesis for the master's degree at Indiana University, under the supervision of Associate Professor Frank G. Bates.

Owing to the discussion in Indiana, during the past year, of the desirability of consolidating the separate boards over the various State institutions by the creation of a single central board of control, which would mean the creation of a "dual system" similar to that found in Illinois, it has been thought that this thesis might be of timely interest. The study has been, in consequence, again revised to include changes in statutes and results of investigations in 1915.

I wish to acknowledge my indebtedness, in particular, to Professor John C. Dunning of Brown University, Mr. Herbert O. Brigham, Rhode Island State Librarian, and Miss Grace

M. Sherwood, director of the Rhode Island Legislative Reference Bureau, for assistance and direction in connection with the original study, and to Mr. John A. Lapp of the Indiana Bureau of Legislative Information for the use of the facilities of the Bureau.

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# State Supervision and Administration of Charities

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## I. INTRODUCTION

In a study of the systems of State supervision and administration existing in the United States it is useless to attempt a classification of any but the more general characteristics of the various State systems, and it is impossible to make any satisfactory comparison of the detailed functions of the numerous State boards.<sup>1</sup> The most satisfactory classification that can be made is that which divides the boards according to their primary function,—of supervision or of administration. The great controversy which has arisen during the past twenty or twenty-five years has been over the relative merits of these two types of boards, which are more generally known by their statutory titles as State Board of Charities (or Charities and Corrections) and State Board of Control, respectively. The standard definition of these is contained in the report made by Chairman Frank A. Fetter of the Committee on State Supervision and Administration at the National Conference of Charities and Corrections in 1909. "The two words in the title [of the report], 'supervision' and 'administration', have been taken in this report not as synonyms, but as indicating two aspects and functions of State boards. By 'administration' we understand the business management, the control, of institutions, so far as this is done by a board and not by the superintendent, the executive head of the institution. Perhaps the most essential administrative function of a board is the appointment of a superintendent. Every institution in this country has at least

<sup>1</sup> "As regards the field covered by the administrative board [board of control] there are fifteen possible variations, eight of which are found in practice, to say nothing of the many minor variations in details." See *National Conference of Charities and Corrections Proceedings*, 1909, p. 398. See also *National Conference of Charities and Corrections Proceedings*, 1903, pp. 358-360.

nominally an administrative board of one or more persons, sometimes an ex officio board consisting of regular State officers, sometimes appointed by the governor, with or without the advice of the senate; sometimes elected by the legislature, or by the people; sometimes partly appointive and partly ex officio; and sometimes selected by still other methods. The administrative board may have varying degrees of control, while more or less of administrative functions may be exercised by some other authority. Some measure of centralized administration may be exercised merely in the supervision of the financial affairs and in the purchase of supplies, the fixing of salaries, etc. With many variations in practice it is sometimes difficult to determine whether a board is to be classed as administrative or supervisory. The simplest type of administrative board is one responsible for the administration of but one institution. 'State administration', as used in this report, however, is in the main concerned with the work of the central boards which control two or more institutions (and usually all those of a single species in a State), either general, covering all the charities, hospitals for insane, and penal institutions of the State, or confined to one or more of these groups of institutions.

"By State supervision is meant the functions of boards generally described as advisory, including inspection, advice, recommendation, and criticism of the management, study of the progressive methods in other communities, diffusion of information, the study and promotion of philanthropic legislation; but in any case not the responsibility of appointing the executive heads or other officers of the institutions. Some boards are administrative as regards certain institutions, as those of the State, and supervisory as regards others, as those of the county, of the city, or of voluntary organizations."<sup>2</sup>

It is evident from this that there is no question whether a State should have an administrative board for its institutions. It has that, of necessity, in some form or other. The two important questions which do arise, however, are: Should the State have a supervisory board? and, Is a centralized State administrative board preferable to individual administrative boards of trustees for each institution? And in the light of

<sup>2</sup> *National Conference of Charities and Corrections Proceedings*, 1909, pp. 397, 398. Mr. Fetter's words may well be taken to apply to this paper.

the more recent legislation and discussion on the subject there is arising a third question which is assuming more and more importance: Should a State have *both* a State supervisory board and a centralized administrative board,—the “dual system”, as it is called? These are the fundamental questions which lie at the bottom of any study of the problem of State supervision and administration of charities. In the following pages an attempt has been made not so much to answer these questions definitely, tho that has been done, as to make patent the conditions which have caused the questions to arise, the various types of State boards, their present status as shown by existing statutes, and the published opinion of authorities on the subject, as well as the advantages and defects of each system.

## II. THE COMPLEXITY OF PRESENT STATE SYSTEMS

There is little uniformity between the charity systems of the various commonwealths of the United States, either in statutory law or in the practical working out of the system. No two States have the same law, and States with similar laws work out their problems in many different ways, owing primarily to the different conditions which confront the State or to the different development of charity problems in each State. However, State supervision or administration, as these terms are used in this study, thru a State board is now almost universal. Of the forty-eight States, forty-four have some form of central supervision or administration by the State. Four<sup>3</sup> have no State supervision except such perfunctory inspection as may be made by the governor or legislature at annual or biennial intervals, the whole power over State institutions resting with the individual boards of trustees. This may be designated as the “trustee type” of State administration. There is no supervision by a central State board.

There are at least seventy boards and commissions in the United States which deal with some part of the problem of State supervision or administration of charities. Of these four consist of a single individual. Alabama has a State Prison

<sup>3</sup> Idaho, Mississippi, New Mexico, and Utah.



Inspector, New Jersey a State Commissioner of Charities and Corrections, New York a Fiscal Supervisor of Charitable Institutions, and Oklahoma a State Commissioner of Charities and Corrections. There are several minor State boards, such as the Ohio and Massachusetts Commissions for the Blind and the New Jersey State Board of Children's Guardians.<sup>4</sup>

For purposes of analysis, however, the larger State boards may be classified according to the three main divisions of the general field of charities. Those fields are broadly: (1) penal and reformatory institutions; (2) institutions for the insane; and (3) strictly charitable institutions. In a few States such as Alabama, Georgia, Nevada, and Texas, the only State board is that over penal institutions,—the Prison Commission as it is called. Eleven States<sup>5</sup> have such boards, usually, however, with another board in at least one of the other fields. Seven States<sup>6</sup> have separate boards over the insane.

By far the most common, however, are those States which have but a single board over all three fields. There are twenty-five States<sup>7</sup> with such a single board. Five States<sup>8</sup> have two boards over the three fields; that is, either a single board over the insane and charitable institutions, with a separate prison commission over the penal institutions, or a charity board over both the penal and charitable institutions, with a separate board over the insane. In no State is there a board over the insane and penal institutions with a separate board over the strictly charitable institutions. Massachusetts and New York have a separate board for each of the three fields, while California has separate boards for each field with an additional fiscal board over all.<sup>9</sup>

Again some States have two boards over the same institutions,—the "dual system" as it is called, which is described

<sup>4</sup> Such minor boards are over subdivisions of the three large fields of charity, and it is not possible in this paper to take the time or space necessary to analyze them.

<sup>5</sup> Alabama, Arkansas, California, Georgia, Kansas, Massachusetts, Montana, Nevada, New York, Texas, and Wyoming.

<sup>6</sup> California, Kentucky, Maryland, Massachusetts, Montana, New York, and Vermont. A committee of the Pennsylvania Board of Public Charities is virtually a separate board over the insane institutions.

<sup>7</sup> Arizona, Colorado, Connecticut, Delaware, Florida, Indiana, Iowa, Louisiana, Maine, Maryland, Michigan, Missouri, New Jersey, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

<sup>8</sup> Arkansas, Illinois, Kansas, Montana, and Virginia.

<sup>9</sup> The California situation, which is peculiar, is treated at some length later.

later. One of the boards is administrative or fiscal, the other is supervisory. These States are California, Colorado, Illinois, Minnesota, Nebraska, New Hampshire, New York, Ohio, Oklahoma, Rhode Island, South Dakota, Tennessee, and Vermont.

In the duties and powers of boards in the same State there is also wide discrepancy. The prison commission may be administrative, the charity board supervisory. There may be a dual system over the charities, while in the same State the prison commission may be supervisory and the lunacy commission administrative, as is the case in New York.

Moreover, there is considerable difference in the scope of the authority of all of these boards. Some may be strictly confined to the supervision of State institutions, while others may have power of inspecting and investigating local and county institutions and even private charity organizations. Some may be given duties which emphasize the fiscal side of the institutions, while others may be specifically forbidden to interfere in any way with the administration of the institutions.

In a few States, the boards have control or supervision of certain groups of institutions located close together. Such is particularly the case in Rhode Island. Certain States, including Minnesota, Rhode Island, South Dakota, and Vermont, have special State boards of visitors to State institutions, while many of the southern and western States with well developed county systems supplement the work of the State boards with boards of county visitors or county boards of charities.<sup>10</sup>

In the main, however, certain tendencies may be noted. The larger States, which have several institutions in the same class, that is, several hospitals for the insane or several penitentiaries, tend to divide the work of charity supervision by placing a separate board over such institutions. There is no such tendency in most States, either because the area of the State is small, or because there are but one or two institutions in the same class, so that one board can cover the whole State satisfactorily. Each State usually has some one problem predominating,—the care of paupers, children, insane, or criminals, and such a State tends to develop a board whose

<sup>10</sup> Indiana and South Carolina are good examples.



essential function is to care for this particular class. Thus in Massachusetts the Board of Charities has two subdivisions, caring for adult paupers and for dependent children. In Illinois the Board of Administration finds the insane the chief problem. In Georgia and other southern States where general charity work upon the part of the State is but little developed, the convict presents the chief problem. In nearly every State a large part of charity work still devolves to a considerable extent upon private philanthropic, local, or municipal organizations. The State Charities Aid Association of New York is the most notable example of such a private organization whose work has been of great importance.

It should always be borne in mind that in many States the administration of institutions is still in the hands of individual boards of trustees rather than under a centralized State board. Thus in at least twenty-four,<sup>11</sup> or fifty per cent, of the States the separate boards of trustees are still charged with the administration of State institutions. Even in States having central administrative boards, the institutions in one or more of the fields of charity supervision may still be under separate boards of trustees. The presence of supervisory boards of charities does not change the function of these individual boards in the slightest degree. Even where there are so-called boards of control, the individual boards of trustees may still exist in the same field, tho often with modified powers. This is notably the case in California, New York, and Rhode Island.

### III. THREE TYPES OF STATE SYSTEMS<sup>12</sup>

In spite of this great variety of boards, the various State systems may be divided into three large groups or types: the supervisory, the administrative, and the dual. The boards under all of these systems have certain minor characteristics in common. The members are usually appointed by the gov-

<sup>11</sup> Alabama, California, Connecticut, Delaware, Georgia, Idaho, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nevada, New Jersey, New York, Oklahoma, Rhode Island, South Carolina, Texas, Utah, Vermont, and Virginia.

<sup>12</sup> This classification deals only with central State boards. There is a fourth type of State system in which each institution is governed by a separate board of trustees and there is no central State board. This may be called the "trustee type". It is fast disappearing and is today of little significance as a State system. See p. 7.

error, with or without the advice and consent of the senate. All of the boards are allowed to appoint a secretary, usually at a fixed salary, together with such clerical assistants and special agents as may be necessary. Thus Indiana has a staff of thirteen besides the secretary, while Iowa has fifteen. The members of all boards are allowed their traveling expenses.

To point out the fundamental characteristics of each system three States have been taken as examples. In each of these the particular system is working with marked success, and the law creating each system is in the main quite typical. What is typical, however, is not the extent of the authority of the boards: that is, the number and kind of institutions controlled or supervised, but the nature of the function exercised and the relation of the central boards to State, local, and private institutions.

**The Supervisory Type—Indiana.**<sup>13</sup> Indiana has eighteen State institutions, each of which is administered in all details by a separate board of trustees. These boards have all powers of appointment, and supervise both the purchase of supplies, by contract or otherwise, and methods of caring for inmates. There is absolutely no connection between the managements of the various institutions. State supervision of these institutions is vested in a Board of State Charities consisting of six members appointed by the governor, who is *ex officio* member and president of the board. Regular meetings are held quarterly or more frequently if deemed necessary. The members receive no compensation.

The board "shall investigate the whole system of public charities and correctional institutions of the State, examine into the condition and management thereof, especially of prisons, jails, infirmaries, public hospitals, and asylums"; may prescribe such forms of reports and registration as it may deem essential to secure accuracy, uniformity, and completeness of statistics. All plans for new jails and infirmaries, before adoption of the same by the county authorities, must be submitted to the board for suggestion and criticism. At its discretion, the board may at any time make an investigation, by the whole board or by a committee of its members, of the management of any penal, reformatory, or charitable

<sup>13</sup> Burns' *Annotated Statutes*, 1914, §§ 3665-3678; 9812a, b.

institution of the State, and in such investigation it has power to send for persons or papers and to administer oaths and affirmations.

The board is also charged with the supervision of official outdoor poor relief; is agent of the State in the supervision of all orphans' homes and associations supported in whole or in part from public funds; visits all institutions caring for neglected or dependent children; passes upon the fitness of associations proposing to incorporate for the purpose of caring for such children; and licenses maternity hospitals and all child-caring institutions. The board appoints a paid secretary who is also ex officio member of the State Board of Truancy.

The powers of the board are entirely supervisory or, as that term is usually understood, advisory. It has no power to interfere in any way with the management of the institutions. The only executive power the board possesses is in passing upon the incorporation of charitable organizations, licensing certain classes of organizations, and passing upon plans for jails and lock-ups.

Indiana also has county boards of charity which report to the State board and greatly supplement its work. This is peculiar to States having well organized county systems, and is not, generally, an essential element of the supervisory system as a whole.

The success of the Indiana board or system lies primarily in the personnel of the board. During nearly every year of its existence the board has had among its members men not only experts in the charity work of their own State, but men who have had national reputations in charity work. The board has been particularly fortunate in the three men who have acted as its secretaries since it was created.<sup>14</sup>

**The Administrative Type—Iowa.**<sup>15</sup> Iowa has a single centralized Board of Control, of three members appointed by the governor, each of whom receives a salary of \$3,000 per year. The board has full charge over all State charitable institutions, appointing the superintendents and fixing all salaries.

<sup>14</sup> Alexander Johnson, Ernest P. Bicknell, and Amos W. Butler. See *National Conference of Charities and Corrections Proceedings*, 1901, pp. 157, 158; 1902, p. 313; *Survey*, April 29, 1916, p. 119.

<sup>15</sup> *Supplement to the Code*, 1907, § 2727a.



For minor employees it fixes a graded scale of wages. Its fiscal control is emphasized. It receives monthly estimates from the superintendents and lays down laws and rules for the purchasing of supplies, which it controls by estimates and contracts, tho the actual buying is done by the heads of each institution. It has also fiscal supervision over the affairs of the educational institutions of the State. The board has full powers of investigation, may summon witnesses, administer oaths, and compel testimony. It is given power of visitation and inspection over county and private institutions for the insane, and over certain other private institutions, and in addition is given the duty of investigating the whole system of State charities, thus combining with its administrative functions some of the duties of the Indiana supervisory board.

It is usual for boards of this type to appoint only the heads of the institutions, allowing the latter to appoint the minor officials and employees. There is often found a provision prohibiting the members of the board from attempting to influence the superintendent in the appointing of the employees under him, in order to prevent the entrance of politics into the internal affairs of the institutions.

**The Dual Type—Illinois.**<sup>16</sup> In Illinois there are two separate boards over the charitable institutions, one a Board of Administration, the other a Charities Commission.<sup>17</sup> The Board of Administration consists of five members, appointed by the governor, who have executive and administrative control over all State charitable institutions excepting the prisons. It resembles the Iowa board in many respects. Its fiscal power is emphasized, and one member, styled Fiscal Supervisor, has special charge over the finances of the institutions. He inspects the books and provides a uniform method of accounting, examines the condition of the buildings and grounds, and supervises the making of repairs. Acting with a committee of the superintendents, he has charge of purchasing supplies by contract. The superintendents sub-

<sup>16</sup> *Laws*, 1912, p. 66.

<sup>17</sup> There is a Commission on Prison Industries, but each institution is under separate management. The committee on Efficiency and Economy of the Illinois legislature, reporting in 1915, recommends a single board over all the prisons and reformatories. The original bill for the dual system in 1909 provided for the prisons under the other two boards, and Dr. Fairlie, director of the Efficiency and Economy committee, believes that is the ultimate solution as far as administration by boards or commissions is concerned.

mit monthly estimates and the fiscal supervisor revises these, always referring important matters to the whole board. The board appoints the heads of the institutions and fixes their salaries. It also establishes a graded scale of wages for the minor officials, who hold office under the civil service plan. In addition to its strictly administrative functions, the board is also given power to inspect and investigate outdoor poor relief, almshouses, children's home-finding societies, orphanages, lying-in hospitals, and any place where persons are detained for treatment of nervous diseases; it also inspects county jails, city prisons, workhouses, etc.; and one of its duties is to collect statistical information concerning the inmates of all these institutions. It must visit each State institution at least quarterly. Each member receives a salary of \$6,000 per year.

The Charities Commission consists of five members, who receive no compensation. Its chief duty is to investigate the whole system of public charitable institutions of the State, examine into the management and condition thereof, especially of State hospitals and local jails and almshouses. In this it is quite similar to the Indiana board, having no mandatory powers. The Charities Commission may inquire, in its discretion, into the equipment, management, and policies of all institutions and organizations coming under the supervision, administration, or inspection of the Board of Administration. It maintains a special Bureau of Criminal Statistics.

From this it is seen that the Board of Administration handles the business details of the State institutions and supervises certain other organizations, while the function of the Charities Commission is purely supervisory. The business of the former is primarily with institutions and organizations; the latter studies the whole charity problem in its broad aspects. The former has the responsibility for the management of each institution, and its methods, both along fiscal lines and in the care of inmates; the latter is in these matters only a checking agency, but without powers which would bring the two boards into conflict. It would seem at first sight that the Charities Commission was simply a system of espionage upon the acts of the administrative board, but such



does not seem to have been the experience of Illinois.<sup>18</sup> The law was framed to create a harmonious system, not to establish two antagonistic boards. The Charities Commission, it is found, has a definite, separate sphere. Its valuable contribution to charity work lies in its educational policy. It holds quarterly conferences with the heads of the institutions and other influential charity workers at which the more advanced problems are discussed. The reports and findings of the conference are published in a quarterly bulletin which is widely distributed thruout the State. Moreover, the supervisory board has an important influence over private charity organizations, and its opinions and advice have considerable weight with such societies, while on the whole this board tends to bring the private organizations into closer touch with the work of the State. The administrative board has a distinctly different attitude. It has power to compel many of the local institutions to conform to its recommendations, and thruout the idea of its superior authority is predominant. The Board of Administration brings fiscal efficiency into the State institutions; the Charities Commission creates a uniform attitude thruout the State on all charity problems and secures coöperation between all the charity agencies, public or private. It fosters and educates public opinion on the practical problems before the State, on the advanced methods which it is seeking to introduce, and on the more enlightened and scientific care and treatment of all classes of inmates—not only while in institutions, but after they have left,—and on methods of prevention.

The distinguishing feature of the dual system lies in the existence of two boards over the same institutions. One board is purely supervisory or advisory. The other may have either complete control over the affairs of the institutions, or administrative powers in fiscal matters only. The Illinois system is virtually a harmonious combination of the Indiana and Iowa boards.

#### IV. CLASSIFICATION OF EXISTING STATE SYSTEMS

Four States have no State board for the supervision of charities. These are Idaho, Mississippi, New Mexico, and

<sup>18</sup> The opinions expressed concerning the Illinois system are based upon personal interviews with some of the Illinois authorities, and upon replies received to individual letters sent to men actively in touch with the situation.

Utah.<sup>19</sup> Four States<sup>20</sup> have only a prison commission, and in most of these States the boards are merely trustees for two or three institutions. But since these boards are State boards over that field which is particularly pressing in these States, and in a limited way do exercise supervision and administration over State charities, these boards have been included in the following classification.

**The Iowa Type.** Sixteen States in the United States are essentially of the Iowa type. They are Arizona, Arkansas, Florida, Georgia, Iowa, Kansas, Kentucky, Montana, Nevada, North Dakota, Oregon, Texas, Washington, West Virginia, Wisconsin, and Wyoming. Three of these are what are known as "ex officio" boards; they consist of officials who already hold an office under the State, and the boards thus made up are not considered of great value in charity work. Arkansas, Georgia, Nevada, and Texas have only a single board of prison commissioners, with no State supervision in other fields.

Kansas has two separate boards, one over the prisons and reformatories, the other over the charitable institutions and insane hospitals. Each board is similar in powers and functions to the Iowa board. Montana also has a second board, the Board of Commissioners for the Insane, which is identical with the Board of Prison Commissioners in personnel, and is therefore hardly to be considered an entirely different board, but rather the same board given a different name for its new functions.

Ten of these sixteen States are more strictly of the Iowa type, that is, they have one board of control over all institutions. These States are Arizona, Florida, Iowa, Kentucky, North Dakota, Oregon, Washington, West Virginia, Wisconsin, and Wyoming. Nine of the sixteen have boards styled Board of Control. These are Arizona, Iowa, Kansas (for the charitable institutions), Kentucky, North Dakota, Oregon, Washington, West Virginia, and Wisconsin. The names of the other boards are as follows: Arkansas, Board of Commissioners of Penitentiary and Reform Schools; Florida, Board of

<sup>19</sup> Idaho has a Board of State Prison Commissioners, and Utah a State Board of Corrections, but these boards are purely boards of trustees for a single State prison. The other prison commissions which have been included in the classification of central State boards possess slightly wider powers.

<sup>20</sup> Alabama, Georgia, Nevada, and Texas.

Commissioners of State Institutions; Georgia, Prison Commission; Kansas, State Board of Corrections (for the penal institutions); Montana, Board of Prison Commissioners, and Board of Commissioners for the Insane; Wyoming, State Board of Charities and Reform.

**The Indiana Type.** There are fifteen States which are essentially of this, the supervisory type. They are Alabama, Connecticut, Delaware, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, New Jersey, North Carolina, Pennsylvania, South Carolina, and Virginia. Of these, ten are strictly after the Indiana type, that is, they have a single board of supervision over all charitable institutions. These are Connecticut, Indiana, Louisiana, Maryland, Michigan, Missouri, North Carolina, Pennsylvania, South Carolina, and Virginia. A subcommittee of the Pennsylvania board, however, has considerable executive power over institutions for the insane.<sup>21</sup> Delaware has a commission of two members, styled Board of Supervisors of State and County Institutions in New Castle county. Altho operating in only one of the three counties of the State, this is really a State board, created by the State, and presumably confined to the county where the State's charity problem is most felt.

Massachusetts has three distinct supervisory boards, one over each of the main divisions of the charity field. These boards are styled State Board of Charities, Commission on Mental Diseases, and Board of Prison Commissioners. The first two boards are supervisory, and in their respective fields quite analogous to the Indiana board, altho the Board of Charities has executive functions in connection with the treatment of adult paupers and in placing out of minors. The Prison Commissioners have somewhat more administrative functions.

New Jersey has a single Commissioner of Charities and Corrections. In the main his functions are similar to those of the Indiana board. He has, however, executive or administrative functions in connection with plans and specifications for State buildings, and his fiscal inspection is emphasized, altho his power is purely that of inspection.

While Vermont is essentially of the Indiana type, it has

<sup>21</sup> See Act of Pennsylvania, May 8, 1883; Purdon's *Digest*, Vol. ii, p. 2362, §§ 23, 24.



recently created a purchasing agent for State institutions, and the peculiar situation resulting therefrom is discussed under the dual system and under the subject of purchasing supplies.<sup>22</sup>

The common name for State supervisory boards is State Board of Charities or State Board of Charities and Corrections. The latter name is the older one, but the former is now regarded as sufficiently inclusive. Eight of the fifteen States bear one or the other of these names. These States are Connecticut, Indiana, Louisiana, Maine, Michigan, Missouri, South Carolina, and Virginia. The names of the boards in the other States excepting those already mentioned follow: Maryland, Board of State Aid and Charities; North Carolina, Board of Public Charities; Pennsylvania, State Board of Public Charities.

**The Dual Type.**<sup>23</sup> There are now thirteen States which may possibly be classed under the dual system. These are California, Colorado, Illinois, Minnesota, Nebraska, New Hampshire, New York, Ohio, Oklahoma, Rhode Island, South Dakota, Tennessee, and Vermont. Of these only Illinois and Ohio are at all similar in the organization and functions given the boards, tho the fiscal side of the State systems of New Hampshire and Vermont are very similar. The Ohio system was quite obviously modeled after the Illinois plan, altho one essential change was made, the Fiscal Supervisor in Ohio not being a member of the board but merely an employee. In California and indeed in all the other States the conditions found are peculiar to each State.

California has four boards: a Board of Control, a State Board of Charities, a Commission in Lunacy, and a Prison Commission, the latter being hardly more than a board of trustees for the State prison. The Board of Charities and

<sup>22</sup> See pp. 23 and 40.

<sup>23</sup> This analysis of State systems is based on the following statutes—California: *Statutes*, 1911, Ch. 349, pp. 590, 1334; 1909, p. 56. Colorado: *Annotated Statutes*, 1912, Ch. 27, §§603, 615; *Session Laws*, 1915, Ch. 152, p. 153. New York: *Consolidated Laws*, 1909, pp. 5377, 5386; 1911, p. 733; 1909, pp. 2441, 4301, 4357. Rhode Island: *Acts*, 1912, p. 187; *General Laws*, 1909, pp. 1332, 1340. Nebraska: *Laws*, 1913, p. 535; *General Laws*, 1909, Vol. ii, § 10318. Minnesota: *General Statutes*, 1913, §§ 4001, 4139. New Hampshire: *Laws*, 1913, p. 650; *Public Statutes*, 1901, p. 278. Oklahoma: *Compiled Laws*, 1909, Ch. 92, pp. 1468, 1469, §§ 7384-7395; Constitution, Art. VI, §§ 27-30. South Dakota: *Revised Code*, 1903, p. 34; *Civil Code*, §§ 171, 307. Tennessee: *Code*, 1896, § 2672, p. 638; *Public Acts*, 1915, Ch. 20, p. 44. Vermont: *Laws*, 1912, pp. 170, 323; *Public Statutes*, 1906, § 6017; *Laws*, 1910, p. 126.

the Lunacy Commission are supervisory in character. The Board of Control is peculiar. Its work is purely fiscal, and it is not confined to the charitable institutions. It is really a powerful auditing board which examines the books, not only of the State institutions of whatever nature, but also of all commissions, bureaus, and offices of the State. Its control over the State charitable institutions rests in its power over claims against the State, which power is absolute. The State comptroller may pay no bills unless they are previously endorsed by the board. Thus, indirectly, the board exercises a very great influence over the fiscal side of all charitable institutions, for all contracts must be approved by it and bills must be submitted to its scrutiny before being paid. The board has also in practice exerted a positive influence over contracts by soliciting bids from responsible firms and assuring them of prompt payment if the contracts are legal and proper. This Board of Control was created primarily to put an end to all possible graft. It is therefore also entrusted with the investment of certain specified funds of the State and in general supervises the financial policy of the State. Quite obviously, this is not primarily a charity board, but it must be classified as constituting a dual system as it is a board with powers of fiscal control over institutions where an existing board is already endowed with supervisory powers. It is to be noted that with all these boards California still has the individual boards of trustees which exercise the usual administrative powers over each institution, particularly that of appointment.

In New York there is also a peculiar situation.<sup>24</sup> There are separate boards for all three groups in the charity field: a State Board of Charities, a State Hospital Commission (over the insane), and a State Commission of Prisons. The Hospital Commission is the only board with full administrative functions. It appoints the heads of institutions, formulates policies, and controls finances. The Prison Commission is purely advisory, but the State prisons are administered by the Superintendent of Prisons, an office established

<sup>24</sup> For discussion of the New York situation and of a bill introduced in 1915 to revise the system, see *Arguments against the Hinman-Sage Board of Regulation Bill for State Institutions*, published by the Committee on Mental Hygiene of the State Charities Aid Association of New York, and *Board of Control for State Institutions Opposed*, a brief submitted to the New York constitutional convention by the same association.



by the State constitution, who appoints wardens, dictates policies, and controls finances. The State Board of Charities is essentially a board of the Indiana type, tho limited strictly to charitable institutions. There is, however, an official, styled Fiscal Supervisor, who, unlike the one in Illinois, is independent and subject to no board. He has general supervision of the finances of the charitable institutions, and exercises rather full powers of fiscal control thru an estimate system. The real administration of the charitable institutions is still in the hands of separate boards of managers or trustees, who appoint the superintendents and determine policies. The New York and California systems are the most complex now existing in the United States.

The situation in Rhode Island is also one not found elsewhere. There are three charity boards: a Board of Control and Supply, a Board of Charities and Corrections, and a Board of Female Visitors. There is also a fourth board, the State Board of Education, which has supervision over the State home and school for children, but which is not a charity board. The Board of Charities and Corrections is essentially the same as the South Dakota board of the same name; that is, of the Iowa type, tho its members receive no compensation and are not expected to devote all their time to the work. It has the general administration of a certain group of institutions, appointing the superintendent and dictating policies. It also, like the Iowa board, investigates the whole system of charities, and in addition exercises certain executive functions in outdoor relief, etc. Its fiscal functions, however, have never been emphasized. The Board of Female Visitors is purely visitorial in function, being a board entirely of women, empowered to visit all State institutions where women are inmates. It by no means has the powers or functions exercised by a supervisory board of the Indiana or Illinois type. The Board of Control and Supply is purely fiscal. Its work is primarily with the State institutions, tho it may at its discretion act as a purchasing agent for other branches of the governmental machinery. Its fundamental power lies in the purchasing of supplies. This it does thru an estimate system, purchasing largely thru contracts over which it has full control. It also controls the labor of the prisoners in the State prison and reformatory and contracts

with individuals or concerns for the services of such labor. The board also has full power to examine the accounts of the institutions and may require certain forms of reports and accounts. Thus, whereas California has a dual system with two supervisory boards, the one general, the other fiscal in function, Rhode Island has a dual system with two administrative boards, the one general, the other fiscal in functions. Neither of these systems has any precedent.

The situation in Minnesota is somewhat more simple. There are two boards: the State Board of Control and the State Board of Visitors for Public Institutions. The Board of Control is quite analogous to the Iowa board; indeed it follows it quite closely, having in its charge the financial management of certain State educational institutions as does the Iowa board. The State Board of Visitors for Public Institutions, despite its name, is not strictly analogous to the Vermont Board of Visitors nor to the Rhode Island board. Its powers are in the main somewhat weaker than those of the Illinois Charities Commission, but its functions are primarily the same. The chief duty of the board is to study the whole subject of care of inmates and management of charitable and correctional institutions, and it has power to examine persons and papers. Its legal powers of investigation, however, are not stated in such sweeping terms as is the case in Illinois or Indiana.

In Nebraska there are two boards: A Board of Charities and Corrections and a Board of Commissioners of State Institutions. Until 1913 the administrative powers over State institutions were vested in the Board of Public Lands and Buildings, which had general charge of State buildings and grounds. The Board of Commissioners was created by a constitutional amendment adopted by the people in 1912. Since the creation of this new board, which is a board of administration for all the charitable, penal, and correctional institutions of the State as well as for the insane hospitals, the Nebraska system conforms more closely to the real dual system found in Illinois and Ohio. The Board of Charities and Corrections is an *ex officio* board, consisting of the Governor, Commissioner of Public Lands and Buildings, and the State Superintendent of Public Instruction. Its functions are quite similar to those of the Charities Commission of Illinois.

New Hampshire entered the ranks of the dual system in 1913. Before that time there had been a board of five persons, styled State Board of Charities and Corrections, similar to the Indiana board. The new administrative board was named Board of Control like the Iowa board and had similar duties. The emphasis at the time of the creation of the board, however, was upon the purchasing of supplies primarily, altho the law specifically declared that the board should have all the powers formerly exercised by the separate boards of trustees. This board, however, did not long remain popular because of its removals for political reasons<sup>25</sup> and in 1915 it was abolished and a Board of Trustees of State Institutions was established. This statute introduces into the dual system an element that has not been much in evidence before, and opens the way for possible modifications of the administrative and dual systems. The new Board of Trustees is strictly a centralized administrative board, having full charge of all State institutions, but it is a large board of ten members, who, like the members of the supervisory boards, receive no compensation. The board appoints a business manager for the institutions and a purchasing agent, who are the ones actively in charge of the institutions.

South Dakota was the first to have a real dual system, its second board being created in 1903. The administrative board is, like that of Rhode Island, misnamed Board of Charities and Corrections, for it is really a board of control. It consists of five members, serving for six years, who control the penitentiary, insane hospitals, schools for the deaf, dumb, and blind, and the training schools for boys and girls. The board has full power to examine these institutions financially and otherwise, to prescribe methods of management, manner of keeping accounts, and other details. The members receive a small compensation. The supervisory board, styled Woman's Investigating Board, consists of three women who constitute a committee of investigation for the State institutions and whose duty it is to visit each institution at least twice a year to enquire into and investigate the sanitary conditions and the treatment and care of inmates. The members serve

<sup>25</sup> See page 9 of "The Care of the Insane under State Boards of Control," by Dr. Thomas W. Salmon, medical director, National Committee for Mental Hygiene. Reprint from *State Hospital Bulletin*, New York, for February, 1915.



for two years and receive a per diem fee of three dollars for each day of actual service. Both boards are limited to State institutions, and there is no State supervision in any other field.

Oklahoma also belongs to the dual system. Until 1909 there was a single officer, styled Commissioner of Charities and Corrections, who performed essentially the same duties as the supervisory board in other States. In 1909 there was created, however, largely thru the efforts of the Commissioner, a State Board of Public Welfare. This board is primarily fiscal in functions, having charge over all State property and the purchasing of supplies. It more nearly resembles the Board of Control of California or Board of Control and Supply of Rhode Island than it does the Board of Administration of Illinois.

Vermont has a rather peculiar system, somewhat similar to that of New York. There is an ex officio Board of Visitors to State Institutions, consisting of the governor, lieutenant-governor, and Speaker of the House of Representatives, which visits the prison, house of correction, industrial school, hospital for the insane, and any private retreat or hospital for insane within the State. The governor may also appoint a woman on the board. Another board of three Supervisors of the Insane visits the Vermont State Hospital and the Brattleboro Retreat and any other hospital or place where insane are confined, and investigates the treatment of inmates. It has general supervision over insane not in confinement. A Board of Penal Institutions of three members supervises the State prison, house of correction, and industrial school, and inspects the methods of discipline, sanitary conditions, and other details. Until 1913 it made all purchases for these institutions by bids and contracts, appointed superintendents, and fixed salaries. In 1912 there was created the office of Purchasing Agent, similar to the Fiscal Supervisor of New York. This development in State administration will be treated at length in a later chapter.

In 1915 there were two additions to the ranks of the dual system, recruited from the ranks of the supervisory system. Prior to 1915 both Colorado and Tennessee had central supervisory boards similar to the Indiana board. In Colorado there was created a Board of Corrections to have full control over

the insane asylum, State penitentiary, and reformatory. In Tennessee a Board of Control was established to govern nine State institutions. In both instances the former separate boards for each institution were abolished, and the new board took over their powers. The Tennessee law makes more careful provision for the financial side of the institutions.

Of these thirteen States; Colorado, Illinois, Minnesota, Nebraska, New Hampshire, Ohio, Oklahoma, South Dakota, and Tennessee are strictly of the dual type; that is, they have two State boards over the same field, one primarily of the Iowa type, the other of the Indiana type, but both with powers, duties, and functions so defined as to avoid conflict of authority. California, New York, Rhode Island, and Vermont are in a distinctly different class. In each the peculiar characteristic is found in the existence of administrative agents whose powers are fiscal only, while the power of appointing superintendents and of otherwise controlling the management of the institutions is in the hands of another body. This is in reality an administrative dual system within the real dual system. There is a supervisory board, but there are two State agencies of control over the same institutions, and the administrative function is divided into fiscal and nonfiscal.

#### V. ARGUMENTS FOR AND AGAINST THE THREE TYPES OF STATE SYSTEMS

There is really no argument today in favor of what may be called the trustee method of administering State institutions. That is, sentiment is almost unanimous today in favor of some sort of State central supervisory or administrative agency. This is clearly seen in actual practice, for out of forty-eight States, forty-four, or ninety-two per cent, have some kind of State board.<sup>26</sup>

For a long time, however, in the history of State supervision of charities, there has waged a vigorous controversy between advocates of a single State board of administration on the one hand, and a single State board of supervision on

<sup>26</sup> See p. 7.



the other.<sup>27</sup> In actual practice the administrative board would seem at first glance to predominate. There are sixteen States with a board of control and thirteen with the dual system, or a total of twenty-nine States with an administrative board. Only fifteen have the Indiana system. However, it should be noticed that in only fifteen<sup>28</sup> of the former States do the State boards cover the whole charity field. Hence in several States the administrative board is found in one field, but in the other fields the old decentralized system of separate boards of trustees with no State supervisory board still exists.<sup>29</sup> However, twenty-eight States now have central supervision.

**The Supervisory System.** The first attempt at uniformity in the functions and powers of State boards began when the National Conference of Charities and Corrections was organized in 1874. Then for the first time representatives of State boards and charity workers in States from all over the United States came together to compare notes, to defend the type of board existing in their State, and to attempt to lay down fundamental principles which should govern the creation of new charity boards. At that time there were in existence eleven State boards for the supervision of charities, only two of which, Rhode Island and Kansas, had primarily administrative functions.<sup>30</sup> The advocates of the supervisory board were consequently in a majority and for a long time thereafter, till about 1900, when the administrative board became more prominent, the supervisory board was the one generally favored.<sup>31</sup>

The supporters of the supervisory board claimed that what the State needed was a board so constituted that it would

<sup>27</sup> "Is a State Board of Control with Full Executive Power Preferable to a State Supervisory Board with no Executive Power?" *National Conference of Charities and Corrections Proceedings*, 1895, pp. 37-43. See also *National Conference of Charities and Corrections Proceedings*, 1882, pp. 19-36; 1895, pp. 442-452; 1905, pp. 599-602. Also an article on "State Control and Supervision" by F. H. Wines, *National Conference of Charities and Corrections Proceedings*, 1902, pp. 147-151.

<sup>28</sup> Arizona, Florida, Iowa, Kentucky, Minnesota, Nebraska, North Dakota, Ohio, Oregon, South Dakota, Tennessee, Washington, West Virginia, Wisconsin, and Wyoming.

<sup>29</sup> In particular, note the situation in California and New York, where, altho there are many State boards, the separate boards of trustees still exist. Also, in Illinois the group of penal institutions are still under separate heads.

<sup>30</sup> See report of committee, *National Conference of Charities and Corrections Proceedings*, 1893, p. 33, on history of State boards.

<sup>31</sup> See report of committee, *National Conference of Charities and Corrections Proceedings*, 1902, pp. 127-129; also 1902, pp. 144-154, 372, 373; 1891, pp. 154, 162, 369; 1893, pp. 42-48.

have power to investigate the whole system of charities in the State, keep closely in touch with the same, and be able to advise the legislature intelligently concerning needed legislation, appropriations, etc. Such a board, it was plain, would be of great service in standardizing the whole charity machinery of the State, in enlightening the legislature, in educating public opinion on the whole subject of charities, and in bringing to the heads of the various institutions valuable advice drawn from the board's experience thruout the State and from its study of the charity practice of other States. It should be merely advisory and it should have members serving without compensation in order not to make it attractive to politicians and office-seekers. The members should be public-spirited citizens with high standing in the State, who would not only themselves be interested in the State institutions, but who would also interest many of the best citizens in State charity work. One of the most prevalent arguments was that it would be highly beneficial to have as large a number as possible of public-spirited men and women in close touch and sympathy with the actual working of State institutions.<sup>32</sup> An argument which arose a little later was that such boards should not be given mandatory powers; that is, should not be authorized by law to force the heads of institutions to accept their recommendations. This argument was insistently urged during the period from 1887 to 1900 when there was a marked tendency to grant such boards increasingly wide executive and administrative functions. It was held that such action would inevitably lead to conflict between the boards and the institutions, and would ruin the utility of the boards as advisory agents.<sup>33</sup>

Thruout, of course, ran the idea of the board as a powerful investigating agent should occasion arise. Its very existence as such an agent, it was thought, would tend to reduce the probability of abuse in the institutions, and in case of an actual investigation of any institution the board could bring its accumulated experience to bear upon the problem. To be sure, its only power lay in its ability to bring the facts before the legislature and to ask for remedial legislation or

<sup>32</sup> *National Conference of Charities and Corrections Proceedings*, 1894, p. 11; 1897, pp. 163-167.

<sup>33</sup> *Ibid.*, 1892, pp. 15-18; 1902, p. 369.

executive action, but it was held that such influence was really sufficient when the members of the board had the confidence of the legislature. Moreover, the board could exert considerable influence by creating public sentiment on the subject.

"A board of charities is a balance-wheel to steady the motion of the charitable machinery of the State," declared one authority. "It is its office to promote the wise founding and the safe running of public charities, to correct and prevent abuses, to check extravagance, to promote economy, and to rebuke niggardliness."<sup>34</sup> And it has been still further claimed that the board not only supervises superintendents to make sure that their duties are well performed, but also acts as a buffer between the heads of institutions and the public, to make the true position of the superintendent clearly understood, and to protect him from unjust or ignorant criticism. If the board does adopt this attitude and attempts to put itself in sympathy with the heads of institutions, it is evident that a superintendent would not only be willing to listen to the advice of the board, but might be eager to place before it all facts at his command, that he might be supported if possible by the board and reinforced by its approval.<sup>35</sup> Many men with wide experience in the work of State supervision of charities have been insistent that a board of control or board of large administrative powers cannot stand in this relation to the heads of institutions because the members are biased owing to their own interest in and responsibility for the management of the institutions, and because the superintendent knows that whatever he may say the board possesses the power to force its own opinion upon him.<sup>36</sup>

The power of the board lies in the prestige of its personnel, its familiarity not only with the conditions in each institution in the State, but also with the general charity situation, the most accepted methods and up-to-date science of charity administration. The keynote of its activity should be coöperation with all the charitable institutions of the State, both public and private. Where boards of charities by their atti-

<sup>34</sup> H. Hasting Hart in report of Committee on State Boards of Charities, *National Conference of Charities and Corrections Proceedings*, 1889, p. 90.

<sup>35</sup> See *National Conference of Charities and Corrections Proceedings*, 1891, p. 369, discussion by Dr. A. J. Thomas.

<sup>36</sup> See the opinion of Gen. R. Brinkerhoff on this subject in *National Conference of Charities and Corrections Proceedings*, 1894, p. 15.



tude antagonize the heads of State institutions and the active private workers and organizations they cannot hope to be useful. Where they have established a reputation for fair-mindedness and ability, their opinion has been of great weight, even tho opposed to that of private organizations.<sup>37</sup> Hence in charity boards has come the demand that the powers should be advisory only. If the board has mandatory powers either antagonism results or it loses its fair-mindedness because of its interest in the management of the institutions it supervises. In many States, however, the supervisory boards have been given executive functions in extra-institutional work such as outdoor poor relief and placing out of children.<sup>38</sup>

One of the most insistent objections made to the Indiana type of State supervision is that the charities board lacks the power to compel the officials of institutions to follow its recommendations. No matter what conditions exist in the State institutions or how great the need of improvements in methods of treating inmates or otherwise managing the institutions, the superintendent may continue these conditions despite the protest of the board. After all its inspection and investigation, the board can only report the bad conditions to the legislature at its next session and ask for remedial legislation. Moreover, the board is usually given little power over the financial side of institutions. It may examine the books and accounts but it has no authority to specify methods or require changes, except in those States where it may stipulate the form of reports for statistical purposes. This lack of mandatory power has, in the eyes of some, been the chief weakness of the Indiana type of supervision and out of it has sprung the newer board of control.<sup>39</sup>

Another objection is that the members of a supervisory board cannot effectively supervise the management of State institutions, since they serve without compensation and are

<sup>37</sup> *National Conference of Charities and Corrections Proceedings*, 1902, pp. 150, 151. This statement is also based upon letters received from authorities in Illinois. Letters on file at the Rhode Island Legislative Reference Bureau. See also report of committee, *National Conference of Charities and Corrections*, 1886: "Yet the great usefulness of a State board . . . resides in the moral powers it exercises rather than in any authority conferred by law." (p. 23)

<sup>38</sup> Massachusetts is the best example of this.

<sup>39</sup> This argument is amplified in the following topic. It should be remembered that these arguments are not strictly against the supervisory board as State agents, but against the supervisory board as compared with the administrative board. The importance of this distinction is brought out in the discussion of the "dual system".

not expected to devote their whole time to the work. The argument which has led to the creation of boards of control, however, has not been directed so much against the supervisory board itself as against the trustee system of management which exists where the supervisory board is the only State agency.

**The Administrative System.**<sup>40</sup> In the beginning the supporters of the administrative board or the board of control were content to declare that in their State their system worked satisfactorily. Rhode Island was the first State to have an administrative board, and in 1882 the chairman of the Rhode Island board while upholding the Rhode Island system at the National Conference of Charities and Corrections declared: "I don't know of one of the larger States that could have a board constituted like that of Rhode Island,"<sup>41</sup> and in the main there was for many years no attempt to advocate the administrative type of board for general adoption. However, from 1887 there was an increasing tendency to give larger administrative powers to the existing supervisory board.<sup>42</sup> In 1900 out of twenty-five<sup>43</sup> boards, eight<sup>44</sup> or thirty-two per cent were administrative,—an increasing proportion. About 1905, moreover, the modern "efficiency" idea began to take root, and from then on the advocates of the administrative type became more prominent. For a long time the idea was prevalent that the two types of boards were quite antagonistic and could not be brought into harmony.

The keynote of the argument for the administrative board was the emphasis placed on the fiscal side of State charity work. The principles of big business, it was claimed, should be applied to State institutions; the mere consolidation of the boards administering the different institutions would result

<sup>40</sup> See *National Conference of Charities and Corrections Proceedings*, 1895, pp. 37-43, for good discussion of argument for administrative as against supervisory board. Also *National Conference of Charities and Corrections Proceedings*, 1902, pp. 140-144, pp. 375, 376, discussion by Hon. John Cownie; 1903, pp. 497-500; 1891, p. 372; 1889, pp. 96-98; 1904, pp. 180-182; p. 601, discussion by Charles P. Kellogg.

<sup>41</sup> *National Conference of Charities and Corrections Proceedings*, 1882, p. 25, Professor George I. Chase.

<sup>42</sup> Note comment of committee, *National Conference of Charities and Corrections Proceedings*, 1902, p. 127.

<sup>43</sup> Report of committee, *National Conference of Charities and Corrections Proceedings*, 1900, p. 169.

<sup>44</sup> Iowa, Kansas, Rhode Island, Nebraska, South Dakota, Washington, Wisconsin, and Wyoming.



in a reduction of the "overhead charges", which would mean a considerable saving. Ten or fifteen separate State institutions could not be run as cheaply when entirely separate in financial management as when consolidated under a single central board.<sup>45</sup> The existing method was exceedingly wasteful. Each institution bought for itself what supplies it needed. If one agency could control purchases, buy in large quantities for all State institutions and purchase by contracts after competitive bidding, a great saving could be made in the prices paid and thousands of dollars could be saved for the State. The existing boards of charities did not emphasize the financial side at all. A central board of control which should have full powers of administration over all the State institutions could eliminate methods of purchasing which were wasteful if not criminal, and could secure better prices, could keep the superintendents to stricter account by prescribing uniform methods of accounting and by forcing the heads of institutions to secure their supplies thru a central board by means of a strict estimate system over which the board would have full control. The board would also appoint the superintendents and fix salaries.

Moreover, a board of paid members who devoted their whole time to the work would be able to exercise far more careful supervision over the affairs of the institutions than a board which was not paid, and whose members were concerned primarily in other affairs. Such a board, the advocates of the administrative board held, would possess all the virtues of the supervisory board: it could inspect and investigate the institutions as the other board had done; it would stand for fiscal efficiency in addition to all that the supervisory board had stood for. This is essentially what the administrative board has always held.<sup>46</sup> It would really be a consolidation of the existing boards of trustees administering the institutions and the supervisory board with all the advantages of each, but in addition would bring about proper financial methods and administration with a resulting financial saving to the State.

<sup>45</sup> It is at this point that the lack of accurate information on the whole subject of State administration and supervision is felt. The only comparative investigation on the subject, the report of Mr. Wright elsewhere referred to, contradicts this idea. See p. 31.

<sup>46</sup> See *National Conference of Charities and Corrections Proceedings*, 1895, pp. 37-43; 1889, pp. 97, 98.

One of the first questions raised against the administrative system is, Granting that a board of control secures efficiency thru centralization of management, is it wise to place so great power in the hands of three or five men? Controlling all State charitable institutions and appointing officials, such a board would have considerable patronage at its disposal; controlling the purchase of supplies and the erection and repairing of buildings, it would have many lucrative contracts to award, and the possibility of graft would be great. The salary alone which would have to be paid to secure men of efficiency and experience to fill the positions would make such a board distinctly attractive to office-seekers and to politicians desiring positions for henchmen. The effect of political influence in charity administration has been the one thing most deplored by charity workers, and the advocates of the supervisory system have maintained that a salaried board of control is less likely to be free from such influence than a board without salary or power of appointment.<sup>47</sup>

Again some have urged that it has not been fully demonstrated that such a central board is really more efficient than a separate board for each institution.<sup>48</sup> Practically the only investigation on this point is that made by Mr. Henry C. Wright for the Russell Sage Foundation and the State Charities Aid Association of New York on methods of fiscal control of State Institutions, in New York, Indiana, and Iowa in 1911.<sup>49</sup> This report shows that the per capita cost for food for the inmates of the State institutions is in Iowa, under the administrative system, \$55.48 per year; in New York under the dual system, \$45.05 per year; and in Indiana under the supervisory system, only \$43.05 per year.<sup>50</sup> The report further shows that the Indiana system of supervision is the least expensive. The cost of State supervision is in New York \$1.00

<sup>47</sup> See "The Care of the Insane under State Boards of Control" by Dr. Thomas W. Salmon; *State Hospital Bulletin*, New York, February, 1915. Also *National Conference of Charities and Corrections Proceedings*, 1898, pp. 247-255.

<sup>48</sup> *National Conference of Charities and Corrections Proceedings*, 1902, pp. 144-147.

<sup>49</sup> See *Survey* 26:314 for comments on Mr. Wright's report by Homer Folks, secretary New York State Charities Aid Association; Amos W. Butler, Indiana; Albert W. Ferris, New York; and G. S. Robinson, Iowa. The New York and Iowa representatives vigorously attack the basis on which Mr. Wright made his calculation. For further criticism of this report see special report of Massachusetts Commission on Economy and Efficiency to the General Court, April 15, 1914, in connection with House Bill 2137, pp. 30, 31.

<sup>50</sup> See p. 340 of the report.

to every \$46.30 supervised; in Iowa \$1.00 to \$54.80 supervised; and in Indiana \$1.00 to \$78.80 supervised.<sup>51</sup>

In answer to this, however, boards of control have merely pointed to results obtained by them. In Iowa the State auditor held that the first year under the board of control there resulted a saving of \$379,490.73 or 26.9 per cent of the expenditure of the year previous.<sup>52</sup> In Wisconsin the administrative board figured that there was an average saving of \$78,868.57 per year for the first seven years of its administration.<sup>53</sup> Ohio saved \$567,000 the first year, and the Illinois Committee on Efficiency and Economy figured an average saving of \$100,000 annually in the charitable institutions alone, under the Board of Administration.<sup>54</sup>

The main objection to the board of control has been based, however, on the fact that as the only existing State agency it must supervise its own acts.<sup>55</sup> As early as 1893 a committee reporting at the National Conference of Charities and Corrections and speaking of the administrative board declared: "Such entire departure from the standard of advisory authority has been taken in Rhode Island, Kansas, South Dakota, and Wisconsin, in none of which is there any remnant or vestige of supervision left, unless an officer can oversee himself. The boards of these States are in direct control, as trustees of the institutions within their respective jurisdictions, and can inspect and advise, only as they can inspect and advise themselves."<sup>56</sup> In 1894 a man of wide reputation and active experience in State supervision declared: "With my views and experience as a member of the Board of State Charities of Ohio for the past sixteen years and my under-

<sup>51</sup> See tables on pp. 247, 338 of report.

<sup>52</sup> See claims of advocates of administrative board, *National Conference of Charities and Corrections Proceedings*, 1900, pp. 179, 180.

<sup>53</sup> *National Conference of Charities and Corrections Proceedings*, 1895, pp. 40, 41.

<sup>54</sup> Message of Gov. Harmon to Ohio legislature 1913. Illinois Report of Efficiency and Economy Committee, 1915, p. 41. The report shows a net reduction in four years of \$418,450.33, despite the fact that the expenditures of the new board of administration for 1910 added \$58,400.68 to the gross cost.

<sup>55</sup> The full force of this argument does not seem to have been realized by many of the supporters of the administrative board. The recent situation in Rhode Island would seem to show that the objection is a very pertinent one. There the State Board of Charities and Corrections in the past few years has been attacked, largely by rumor and innuendo, as inefficient, grafting, etc., but there was no other body familiar with the situation, for that board itself was the only one possessing the facts and could not be expected to inform against itself.

<sup>56</sup> See report of Committee on State Supervision and Administration, *National Conference of Charities and Corrections Proceedings*, 1893.



standing of the reason for creating such boards, I do not see how it [the supervisory board] can become a board of control and continue to be a board of State charities. . . . To secure . . . inspection and investigation, boards of State charities have been created, and in the nature of things they must be purely advisory if their functions are to be performed with entire impartiality. To give them executive or administrative power is to defeat the purpose of their creation; for a board of control cannot properly investigate its own actions.<sup>57</sup> And many similar expressions are found in the records of the National Conference.

Another apparent danger in the administrative system is this,—that the administrative board does not have as much interest in the general charity problems of the State as a supervisory board does. Boards of control, created with the motive of efficiency uppermost, have devoted practically their whole attention to the business side of the State institutions, forgetting that there is a professional side. Mere fiscal efficiency may not be of much benefit to the State if the professional side of charity work is neglected, or if the number of inmates in the various institutions is allowed to increase. It is of more importance to seek out the fundamental causes of the State's charity problems, to devise preventive methods and scientific treatment of inmates in order to decrease the State's problem. The State board should lead and direct the popular effort to eradicate the evils which fill the State institutions with an increasing number of inmates. Quite evidently a board of business men seeking to put the State institutions on a better financial basis, and chosen for that purpose, cannot be expected to realize the importance of the professional side or to sympathize with that side of the charities problem. And hence there is a very grave danger that under the administrative system the State board will set fiscal efficiency on a pedestal and worship that, while the great underlying and vital problems are neglected. That this is not true of certain State administrative boards is shown by experience, but the exception is usually due to personnel. Boards of control are generally considered as primarily business boards, and men are appointed who are busi-

<sup>57</sup> Gen. R. Brinkerhoff, *National Conference of Charities and Corrections Proceedings*, 1894, p. 15.

ness men without experience and training, and often with no particular interest in charity work. Boards of charities have a distinctly different attitude.

**The Dual System.** Even as late as 1900 there is no reason to suppose that anyone had formulated an argument favoring a "dual system". At least there is no record of that fact in public discussion or on the statute books. In fact, until 1909 the dual system was the result of conditions in individual cases rather than the result of a positive principle. However, looking back thru the past records a growing tendency leading towards such a system is clearly perceptible.

Certainly in 1895 no such system was deemed practicable. Wisconsin, which had established a supervisory board in 1871, established a board of control in 1881. The two boards existed as an inharmonious dual system until 1890 when the old system was abandoned and a single board of control was established. Consequently in 1895 a member of the Wisconsin board argued that the experience of Wisconsin showed a board of control to be the better board.<sup>58</sup> What that experience really did show was that at that time the attitude of the two boards was antagonistic, each deeming the other infringing on its special field and rights.

Yet that same year a member of the Conference in the discussion on State boards declared: "But the main point as to the discussion is that the two functions of the board of control and the board of public charities are entirely different. . . . It would seem to me that the functions to be performed by these two bodies are not only distinct but utterly incompatible; for it is impossible for one board to properly exercise the functions of these two boards. How can they supervise themselves? How can they inspect the institutions which they administer? . . . I think these are so incompatible with each other that where there is a board of control there should be a board of charities also, the board of control holding the position of trustees of the State institutions, the board of State charities existing for the inspection and criticism and keeping straight the county and private institutions."<sup>59</sup>

For some time it seemed as if this idea was considered of

<sup>58</sup> *National Conference of Charities and Corrections Proceedings*, 1895, pp. 37-43.

<sup>59</sup> *Ibid.*, 1895, discussion by Philip C. Garret, pp. 449, 450.



little practical importance, for no great discussion has ever taken place with the dual system for its theme. However, the argument is brought up again and again in the years following.

In 1901 the office of Fiscal Supervisor of Charitable Institutions was created in New York, but the situation occasioned but a passing comment.<sup>60</sup> In 1902 in the committee's report on State supervision and administration occurs this remark: "Let us get clearly in mind that the chief duties of a board of control, whether of one or of several institutions, and the duties of a State board of supervision are not the same. The less the laws try to make them identical, the better. Nor need the existence of one board drive out the existence of the other."<sup>61</sup> The same year an authority of reputation said on the same topic: "They [administrative boards] would be very much less objectionable if they did not mean the abolition of the supervisory boards, but two central boards cannot ordinarily be maintained in one State. If they could there would almost inevitably exist rivalry and conflict between them."<sup>62</sup>

The next year, 1903, however, Professor George F. Canfield of New Jersey declared: "Now there is a fifth possible system, one which has hitherto been very little considered and in fact has not yet, so far as I know, been put into operation anywhere. That would be a system of management and control by a central authority, supplemented by central supervision."<sup>63</sup>

In 1907 the committee's report speaks of the "radical difference of purpose between the supervisory boards of charities and the boards of control".<sup>64</sup> The same year a Massachusetts member of the Conference declared: "Two main principles should be observed in the management of every public charity—first, there should be one responsible head in control of local administration (the Board of Control exemplifies this principle alone); secondly, the acts of such a head should be reviewed by some supervisory authority. A board of super-

<sup>60</sup> See report of Committee on State Supervision and Administration at National Conference that year.

<sup>61</sup> *National Conference of Charities and Corrections Proceedings*, 1902, p. 129.

<sup>62</sup> *Ibid.*, 1902, p. 151.

<sup>63</sup> *Ibid.*, 1903, p. 495.

<sup>64</sup> *Ibid.*, 1907, p. 20.

vision should have authority to investigate, to recommend, to gather information, to arrange it in comparative form, and to keep each institution under its supervision informed of the doings of every other. It is supplementary to a Board of Control and would give balance and safety to the system."<sup>65</sup>

The same year a member of the Kansas administrative board declared: "The first thing it seems to me that is brought out is this, that the two systems, Boards of Control and Boards of Charities, are not necessarily inconsistent or antagonistic to each other. . . . Now, a board that will devote its whole time to the management and control of State institutions is the kind of a board you want from any business point of view. You want also to have a Board of Charities to supervise and look over things and inform the public. I cannot see where there is any particular antagonism in the two systems."<sup>66</sup>

The first positive claim of a dual system was made the same year (1907) by a member from South Dakota. "We have the institutions under what is called a Board of Charities and Corrections, but which is really a Board of Control. . . . We have a Woman's Board which is required to go in twice a year and look from cellar to garret and report directly to the governor, so you see there is model supervision as well as control."<sup>67</sup> The Woman's Board referred to, however, did not have nearly as wide powers as are given the Charities Commission under the Illinois dual system. In 1907, moreover, Minnesota, which had abolished her supervisory board and established a Board of Control in 1901, re-established the supervisory board under the name of State Board of Visitors for Public Institutions.<sup>68</sup> There were then three examples of the dual system in existence, in Minnesota, New York, and South Dakota, tho the New York system was peculiar, as explained before.

In 1909 the National Conference first definitely discussed the growing harmony between the two types of boards.<sup>69</sup> In that year Illinois, after nearly six years' discussion and agi-

<sup>65</sup> *National Conference of Charities and Corrections Proceedings*, 1907, pp. 45, 46.

<sup>66</sup> Mr. H. C. Bowman, *National Conference of Charities and Corrections Proceedings*, 1907, pp. 48, 49.

<sup>67</sup> Mr. D. C. Thomas, *National Conference of Charities and Corrections Proceedings*, 1907, pp. 50, 51.

<sup>68</sup> See *Minnesota Acts*, 1907, Ch. 441, p. 626.

<sup>69</sup> *National Conference of Charities and Corrections Proceedings*, 1909, p. 404.

tation, finally decided upon the dual system as the best. This decision was reached after careful analysis and comparison of the merits of many State systems, and the result is the first attempt to set up the dual system in preference to any other.<sup>70</sup>

In brief, the whole argument for the dual system may be stated in this way: for efficiency and economy the management of State institutions should be centralized, but there is as much demand for a State supervisory agency when there is a board of control over all State institutions as when there are separate boards of control, or trustees, for each institution.<sup>71</sup> And further, experience has shown that there are two distinct functions to be performed, so that the supervisory board still has an important place where there is a State board of control.

As has been said, so far there has been no wide recognition of the issue—dual system versus the supervisory or administrative system—but from the tendency in the past and from present experience, it seems safe to predict that in the future the discussion on State supervision and administration will turn more and more on this issue rather on the old issue of supervisory system versus administrative system.

Thus far there has been no positive argument against the dual system, perhaps because the issue has not been definitely recognized. This system seems to answer all the objections raised against either of the other systems, while it has retained all the merits of both. There is an administrative board bringing fiscal efficiency to the State institutions and economy to the State. There is also an advisory board to advise superintendents, supervise public organizations, study the whole charity problem, and investigate acts of the administrative board or the heads of institutions.

The only objection to the dual system that appears is that there is danger of antagonism between the two State boards. In the dual administrative system, such as is found in Rhode Island, California, and New York, there is doubtless such danger. In States of strictly the Illinois type conflict of authority is not possible, inasmuch as the supervisory board

<sup>70</sup> Reports of Board of Public Charities, Illinois, 1908, 1909.

<sup>71</sup> *National Conference of Charities and Corrections Proceedings*, 1903, p. 503, discussion by Ernest P. Bicknell, Timothy Nicholson, and Judge Robinson.



is given no executive or administrative powers which can bring it into conflict with the administrative board.

## VI. PERSONNEL OF STATE BOARDS

By far the most important feature in any system of supervision of charities is the personal character and qualifications of the members of State boards.<sup>72</sup> Almost without exception, it would seem, where any system of charity supervision or administration is working particularly well in practice, this result is due to the character of the men on the board rather than to the merits of the particular system. This is clearly shown by the fact that all three types of systems are working well in practice, for the success of each of the three different systems can hardly be due to the superlative merit of any one particular system. Unfortunately, good men cannot be ensured by legislative enactment, and while several States do make certain requirements as essential for membership, most States leave rather full discretion of appointment with the appointing power.

As the "spoils system" has been almost universally blamed for the inefficiency of State supervision and administration, some States have attempted to prevent "politics" in State boards by inserting in the law certain political requirements or limitations.<sup>73</sup> However, the great responsibility for the efficiency or inefficiency of State boards seems to rest primarily upon the one possessing the appointing power, usually the governor. In Indiana, Iowa, and Illinois, credit for the excellent membership of the boards has been laid at the door of progressive and independent governors who have insisted on appointing men of training and experience in charity work.

Nearly half the States make some definite mention of special qualifications for membership on their boards.<sup>74</sup> Of

<sup>72</sup> *Survey*, 26:314; *National Conference of Charities and Corrections Proceedings*, 1903, pp. 504-506; 1905, p. 500; also 1902, discussion by Alexander Johnson, p. 373, and by J. R. Brackett, pp. 367-370.

<sup>73</sup> See *National Conference of Charities and Corrections Proceedings*, 1893, p. 49, for comment typical of most charity workers; also report of Committee on Politics in Charitable and Correctional Institutions, in *Proceedings*, 1899, pp. 233-254; 1900, pp. 34-43; 1898, pp. 241, 242, 247-255, "The Spoils System".

<sup>74</sup> There are in fact twenty-two States with some such provision: Arizona, California, Connecticut, Delaware, Florida, Indiana, Illinois, Iowa, Kansas, Massachusetts, Minnesota, Missouri, Montana, Nebraska, Nevada, New York, Ohio, Rhode Island, Vermont, West Virginia, Wisconsin, and Wyoming. Such provision, may, however, apply to only one board in a State with no provision for the other boards.

these, seven<sup>75</sup> provide in the law that certain officials shall constitute the board. These are termed *ex officio* boards and, as has been said before, are not held to be of great value. The members are usually the governor, attorney-general, secretary of State, or State treasurer, and these officials have too many other important duties to perform to give careful or continuous attention to the State's charity problem. States with such boards are not among the most progressive in State supervision of charities.

Several States provide for women members on the board. Connecticut, Massachusetts, and Missouri stipulate that two members shall be women. Wisconsin and Delaware provide for one woman member. The Oklahoma Commissioner of Charities and Corrections is a woman. California, Indiana, and Colorado specify that women may be members. Other States with minor boards, particularly those with county boards of charities or county boards of visitors, specify that women shall be members of such minor boards.<sup>76</sup> Wisconsin is the only State with an administrative board which has such a provision.

California, Massachusetts, and New York have special qualifications for their lunacy commissions. The New York law is particularly definite, providing that the president of the board shall be a reputable physician of at least ten years' standing, and that another member shall be a reputable counsellor-at-law of at least ten years' standing.<sup>77</sup>

Some States have a political provision virtually requiring minority representation. This provision is usually so worded that "not more than two shall be of the same political party". California, Illinois, Indiana, Iowa, Kansas, and Ohio are among these. Some States require that all counties or sections of the State shall be represented. Among these are Rhode Island, New York, and Kansas.

California and Wisconsin provide that the members of their boards of control "shall give their whole time to the work".<sup>78</sup> The provision is in these words in Wisconsin. In California the members shall not engage in any other work

<sup>75</sup> Arizona, Florida, Montana, Nebraska, Nevada, Vermont, and Wyoming.

<sup>76</sup> Indiana is the best example of this.

<sup>77</sup> New York *Consolidated Laws*, 1909, Vol. ii, p. 2441.

<sup>78</sup> Wisconsin *Statutes*, 1913, Ch. 29, §§ 561a-572a, p. 329.



"between the hours of nine a.m. and five p.m."<sup>79</sup> Several other States make some such provision preventing the members of the board from holding any other lucrative office under the State. West Virginia and Minnesota are among these. In Indiana the provision is constitutional, applying to all State offices.

Members of supervisory boards usually receive no compensation except in a few States, like New York, where they receive a small per diem fee. Members of administrative boards have always received salaries, ranging from \$1,200 to \$7,500, excepting only in Rhode Island, where the members of the Board of Charities and Corrections have never received compensation. The situation which has just arisen in New Hampshire owing to the creation of a nonpaid central administrative board of trustees, who appoint a salaried business manager and a purchasing agent, is a new departure in the field of administrative boards. It is avowedly a device to take the appointment of heads of institutions out of politics, but if the experiment proves successful it may give rise to the question whether it is better to have a small board of business men devote their whole time to the work, at a large salary, or to permit a large, unsalaried board of men interested in charities to exercise nominal administration over the institutions, by the appointment of one or more salaried central agents who will exercise actual control.

The table appended at the end of this paper gives the names of the different boards in representative States with the number of members, their compensation, term of office, and qualifications if specified.

## VII. PURCHASE OF SUPPLIES

The fundamental method by which an administrative board or board of control exercises its control over the finances of the various institutions under its jurisdiction is the estimate system. The superintendents or heads of institutions submit monthly or quarterly estimates of the supplies of food, clothing, etc., needed by the institution during the next period. The central board revises these, either arbitrarily cutting down the amount, lowering the quality, or reducing the price,

<sup>79</sup> *California Statutes*, 1911, Ch. 349, p. 591.

or else checking off objectionable items, and returning the estimate to the superintendent for explanation or further revision. It is at this point that the centralized administrative system has been most sharply attacked. The report of Mr. Wright, to which reference has already been made, shows clearly that where the relations between the central controlling agency and the heads of institutions is marked by coöperation the estimate system works well, but that there is grave danger that the central board will misunderstand the situation, miss the point of view of the professional attitude, and fall into a policy of false economy. As the secretary of the State Charities Aid Association of New York puts it, the report shows "how a so-called business arrangement may subject the decisions of competent superintendents of wide experience, and whom the State thinks it worth while to pay large salaries, to revision by clerks sitting in offices at Albany, who have had no experience in institutional management and have little knowledge of the actual working or needs of the institutions."<sup>80</sup> Such a situation is more likely to arise in a large State where the institutions are at a considerable distance from the central office, where the amount of business is so great that the officials of the administrative board find it necessary to leave many of the important details to their small-salaried clerks, but it is certainly a very present danger in any system of centralized control. No general rule can be laid down, but in the main it would seem that the fault does not lie altogether with the system. Where the members and officials of the administrative board are fair-minded and sympathetic in their attitude, there is little danger of such misunderstandings, altho there will always be conflict in authority. Where the members of the board of control are indifferent or officious, or where they fail to make due allowance for the experience and knowledge of the superintendent in his special field, or where from their exalted position, controlling all State charities, the members fall into the delusion that they are all-wise on that subject, there is certainly grave danger of such occurrences.

The method of contracting for supplies has also come in for criticism. Under some laws boards of control are required to purchase all supplies by contract. It is evident, as

<sup>80</sup> Discussion of Mr. Wright's report by Homer Folks in the *Survey*, 26:314, 315.

shown by Mr. Wright, that in many instances this results in a higher price being paid for some articles than some institutions would have had to pay in the local market. To obviate this difficulty, several States provide that superintendents, with the consent of the board, may purchase supplies in the open market up to a certain specified sum, from \$100 to \$500 usually. This means that an institution may benefit by any local conditions in which the local market price is low, temporarily or otherwise. There is also a provision in nearly every law that every institution shall have a definite contingent fund at its disposal for emergency for which no detailed estimate need be given. Just how far the superintendent may act in this regard depends upon the attitude of the members of the board of control. Some States, as for example New York, specify that all purchases shall be for cash at thirty days, except that the board may permit two or more institutions to make joint contracts for certain supplies for longer periods.

**Digests of Provisions of Typical Laws.** The following digests of existing statutes in representative States will give a clearer idea of the different ways in which different States treat the problem.

*Administrative Boards—*

ARIZONA. The Board of Control shall purchase all supplies for the institutions under its control; shall advertise for bids, for supplies over \$100 in amount, and shall award to the lowest bidder. The law specifies the method of advertising, opening bids, etc.—*Revised Statutes*, 1913, § 4452 et seq.

IOWA. The board of control shall make specific rules concerning the purchasing of supplies. "Contracts may be entered into under the direction of the board by proper officials of one or more institutions for staples and supplies which it is feasible to purchase in bulk or for use for periods longer than thirty days.—*Supplement to Code*, 1907, § 2727a et seq.

KENTUCKY. The board of control shall purchase supplies by bids, for purchases over \$1,000.—*Acts*, 1906, Ch. 18, p. 60.

NORTH DAKOTA. Contracts may be entered into under the direction of the Board of Control by proper officials of one or more institutions for staples and other articles or supplies to be purchased in bulk for periods longer than thirty days. The board shall make specific rules respecting the purchase of supplies and contracts for the same, but the purchase is to be made by the executive officer of each institution. There is a quarterly conference between the members of the board and the heads of insti-



tutions to consider in detail all questions of management and methods.—*Laws*, 1911, Ch. 62, p. 86, §§ 20, 38.

*Dual System—*

CALIFORNIA. All contracts entered into by any State officer, board, commission, department, or bureau, for the purchase of supplies and materials shall, before the same become effective, be transmitted with all papers, estimates, and recommendations concerning the same, to the State Board of Control. No State officer shall purchase supplies in the open market without the permission of the board, except in emergencies for amounts under \$100.—*Statutes*, 1911, Ch. 349, p. 590.

ILLINOIS. The managing officers of the various institutions meet at least annually with a committee from the Board of Administration "for the purpose of classifying the supplies and estimating the requirements of the various institutions". This committee is styled the Board of Joint Estimate. It is the duty of this board under the direction of the Board of Administration, to provide for the purchase of supplies in large quantities on contracts for periods not exceeding fifteen months from the date of the contract. The board annually elects two members to act with the Fiscal Supervisor as a standing committee to supervise the purchase of supplies. The Fiscal Supervisor shall have full knowledge of all details of every business transaction of the committee. Purchase is by competitive bidding after specified advertising.—*Laws*, 1912, p. 78, § 15.

NEW YORK. The law provides a Fiscal Supervisor who receives annual inventories of supplies and property from the institutions. He must approve all monthly estimates of supplies before certifying them to the comptroller. He may alter and revise these as to quantity, quality, and cost. Thereon the comptroller authorizes the boards, managers, and trustees of the separate institutions to purchase as estimated. No accounts except those in the estimates shall be paid by the treasurer. All purchases shall be made for cash or on time not to exceed thirty days. Annually the Fiscal Supervisor calls the superintendents of the institutions to meet at his office. They designate a purchasing committee for the year. This committee may award joint contracts of staple articles of supplies.—*Consolidated Laws*, 1909, Vol. v, p. 5386; *Supplement*, 1911, p. 733.

OHIO. The board is required to purchase all supplies needed for the proper support and maintenance of the institutions by competitive bidding under such rules as the board may adopt. Detailed monthly estimates are required.—*General Code*, 1910, §§ 1349-1359.

RHODE ISLAND. The board of control shall purchase and make all contracts for the purchase of supplies for the use of all State institutions (charitable). An officer of an institution may, however, be commissioned to purchase an amount not to exceed \$500 at one time. The law specifies in detail the manner of advertising for bids and the awarding of contracts. The board appoints a disbursing agent at each institution who has charge of the supplies received.—*Acts*, 1912, Ch. 825, p. 187.

*Supervisory System—*

CONNECTICUT. The warden of the prison shall provide for prisoners suitable food and clothing; shall act as general agent of the prison in the

purchase and sale thereof, which shall be for cash only; and shall keep accurate accounts thereof.—*General Statutes* (Rev. 1902), § 2901.

INDIANA. In the purchase of all supplies that enter into the maintenance of any of the institutions (benevolent), it shall be the duty of the board of trustees to invite competitive bids thru sealed proposals to the president of the board of each institution.—*Burns' Annotated Statutes*, 1914, § 3441.

In general it is to be noted that the State supervisory boards exercise no control over the purchase of supplies. Hence there is nothing concerning such purchase in the statutes creating those boards. The purchase of supplies is either left to the head of the institution, or is in the hands of the board of trustees.

In the case of the administrative board of the Iowa type, there are two methods. One is to prescribe in the law definite regulations governing the purchase of supplies thru the board. The other is to give the board full power over such purchase and permit it to adopt such rules and regulations as it sees fit.

The most encouraging tendency in the purchase of supplies and indeed in the general management of institutions by an administrative board, whether of the Iowa or Illinois type, is that towards holding conferences with the heads of institutions at which all matters concerning the administration of the institutions are discussed. The latest development along that line is the Board of Joint Estimate in Illinois.<sup>81</sup> The tendency towards coöperation, as shown in these conferences, as against arbitrary procedure by the central board, promises to be the prominent feature of future action by boards of State administration. It brings into action the heads of the institutions who, as the ones most concerned and usually most fitted by training and experience to advise the board relative to such matters, no longer feel that a board of business men with little real knowledge of the detailed work of the institution is trying to arbitrarily lay down the law to them. As these superintendents are usually men of far greater interest and experience in the charity field and receive larger salaries from the State than members of the controlling board, it has naturally been a source of no little exasperation to them in the past when the central board has arbitrarily dictated to them. An attitude of coöperation can and has changed this.

<sup>81</sup> The following statement is based on personal letters, some of which are on file at the Rhode Island Legislative Reference Bureau.



The Board of Joint Estimate has worked well in Illinois during the short time it has existed, and there are now several States with similar conferences.<sup>82</sup> New York has a similar board and Iowa, Minnesota, and North Dakota hold quarterly conferences of a fiscal nature.

**Central Purchasing Agents.** There is one development in the control of supplies which needs special comment. It is the dual administrative system, already referred to, which exists in California, New Hampshire, New York, Oklahoma, Rhode Island, and Vermont. The fiscal board or official in each of these States is primarily interested in the purchase of supplies or the supervision of contracts, and is not interested in the general management of the institutions, as is the case with other boards of control. New York and Vermont place this power in the hands of a single individual. California, Oklahoma, and Rhode Island have a State board solely for the central control of contracts and supplies. The New York Fiscal Supervisor was created in 1901; the Oklahoma Board in 1909, the California Board in 1911, the Vermont State Purchasing Agent and the Rhode Island Board of Control and Supply in 1912, and the first New Hampshire Board in 1913. Texas has had, since 1899, a State Purchasing Agent, who makes all purchases for the State eleemosynary institutions. Most of these offices have not been established long enough to show whether they are temporary makeshifts or boards of permanent value. Certainly such boards can do much to eliminate graft in institutions and wasteful and ill-considered methods of purchasing supplies. Whether such a central purchasing agency, not only for charitable institutions but also for all State offices, as in California, will ultimately prove to be an asset is a question that cannot now be determined. Certainly there is a very definite tendency towards creating such offices. The Connecticut governor in his message, January, 1915, urged the creation of such an agency in Connecticut. The governor of Alabama recommended similar action, and other governors have also recommended some such action at various times. So far as can be determined from available information such proposals seemed to be based on general theory as to the advantage of big business methods

<sup>82</sup> See pp. 42, 43, and Appendix A.

rather than on any careful comparative study as to actual results accomplished by existing boards. That finances can be successfully divorced from the general administration of institutions is a proposition that needs to be further established. Certain experiences in the past have not been favorable to that theory. In Minnesota in 1901 the State Board of Control was given financial control over the affairs of the State educational institutions, with the result that the educational institutions protested and refused to permit such action. The case was taken to the courts and the statute upheld, but at the next session the legislature decided to limit the powers of the board in that regard. The experience of Rhode Island has certainly not been favorable.<sup>83</sup> Finances are so vitally interwoven in all the action of administration that the result has been protest and conflict thruout.

Two States which have recently experimented with a central purchasing agency have abandoned it and adopted a administrative board, which exercises all administrative powers and does not attempt to control institutions purely thru finances. These State are Oregon and New Hampshire. In 1911 Oregon created a State Purchasing Board. In 1913 this was abolished and the Oregon State Board of Control was established in its stead. As the personnel of the two boards was the same, the change was entirely one of system, the experience of Oregon in two years evidently being that a board with fiscal power only was inferior to a general administrative board. In New Hampshire the change was primarily one of personnel—to take the administrative side of State institutions out of politics. In 1913 a Board of Control was created, consisting of “two capable persons” together with the governor, secretary of State, and the State purchasing agent. The latter officer was created by the act. The change in 1915 was from this politically composed board to a central nonpaid “board of trustees”. The idea of a central purchasing agent was continued but he was made the employee of the board rather than an independent member, and another official styled Business Manager was also established under the control of the board. Thus what little experience there is available indicates that a central purchasing agency with purely fiscal powers is not as satisfac-

<sup>83</sup> See *Providence (R. I.) Sunday Tribune*, May 9, 1915.

tory as the typical administrative board whose fiscal powers are emphasized as a part of its regular administrative control. That the method of fiscal control and the degree of such control can be much better worked out than they are at present is quite true. And this is one of the gravest problems that is now pressing for solution.

### VIII. SUPERVISION OF OTHER THAN STATE INSTITUTIONS<sup>84</sup>

For the past fifteen years the subject of supervision by State boards over other than State institutions has been much discussed. It is now the almost universal practice for State boards to supervise county and municipal institutions, including jails, lock-ups, poor farms, and asylums for the insane. In some States the board must approve all plans for new buildings or extensive repairs for such institutions; in others the board may even condemn buildings which are unsanitary if such condition is not remedied in a reasonable time.<sup>85</sup>

In other respects the subject of State supervision is still an open question. The insane are usually regarded as a group apart, and it is generally considered that this class of dependents should be under the supervision of the State. There are at least fourteen States<sup>86</sup> which give their boards such power. The prevailing idea is that the board should first of all inquire whether such inmates are properly held, and whether they are treated humanely. Some boards, especially in States where there are separate boards over the insane, are given power to determine the condition of persons restrained of their liberty as insane, and to compel the release of any adjudged sane.

In general, there is a definite line drawn between public

<sup>84</sup> See *National Conference of Charities and Corrections Proceedings*, 1891, p. 156; 1893, pp. 40-42; 1899, p. 384, "Relation of State Board of Charities to Child Caring Societies and Institutions", by Hugh F. Fox; 1902, p. 130, report of committee; p. 136, "Private Institutions and Public Service," by Rev. D. J. M. Mahan, General Superintendent of Catholic Charities of New York City, who says, "I do not think that there is any private organization existing today that ought to exist which would fear inspection by a State board of charities"; pp. 367-373, discussion by J. R. Brackett, Dr. F. H. Darby, and Max Landsberg; 1903, discussion, pp. 508-512; 1904, p. 180, "Limits to State Control and Supervision", by A. W. Clark.

<sup>85</sup> In Alabama, California, Indiana, Nebraska, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia the State boards approve plans for jails and infirmaries.

<sup>86</sup> California, Connecticut, Delaware, Illinois, Indiana, Massachusetts, Minnesota, New York, North Carolina, Tennessee, Vermont, Virginia, Wisconsin, and Wyoming.



and private institutions. In a decision of the Court of Appeals, New York, on January 9, 1900, it was held that the term "public charitable institutions" meant those institutions receiving financial aid from the State. In this field it is now generally held that the State not only has the right but also the duty to supervise all institutions which it supports in whole or in part.<sup>87</sup> In such institutions there is the additional motive of ascertaining that the funds have been properly expended, since they are State funds appropriated for that purpose. At first such supervision or inspection was strenuously opposed by the heads of institutions, and charity authorities have held that the State should not be too inquisitorial in such matters. The modified opinion prevalent today is that, while the State may and ought to inspect such institutions, its aim should be primarily to discover whether the methods and results have in the main been satisfactory, rather than whether every penny of the State's money has been most judiciously expended.

In several States the State board is given the supervision of all charitable institutions incorporated in the State. It is claimed that such incorporation brings these institutions under the class of public charitable institutions. Such corporations are exempted from taxation and it is urged that this is virtually an indirect grant of State money to them.<sup>88</sup>

By far the greatest controversy has arisen over State supervision of what are called strictly private institutions. Among these are included those receiving public aid thru donations, subscriptions, etc. For the past ten years there has been an increasing sentiment favoring State supervision of such institutions. This has been vigorously fought by private institutions everywhere as a usurpation of power on the part of the State. In practice relatively few States have given their boards wide powers in this regard. There is noticeable, however, in the last few years a definite tendency upon the part not only of State charity workers, but also of heads of private institutions, to favor such inspection and

<sup>87</sup> California, Colorado, Iowa, Maryland, Missouri, New Jersey, and Oklahoma are among those conferring power upon the State board over institutions receiving State aid (which usually includes county and municipal aid). Missouri includes institutions receiving public aid and bequests.

<sup>88</sup> See report of committee, *National Conference of Charities and Corrections Proceedings*, 1903, p. 359. Massachusetts, Virginia, and Wisconsin specifically confer certain authority over charitable institutions which are incorporated in the State.

supervision. There is one argument which transcends all others. If the State board is to deal with the problem of charity in the State it must be able to ascertain just what that problem really is. As has been said before, a great part of the charity work in most States is still carried on by private philanthropic institutions. These are dealing in a private way with what is in reality a State problem; their work ameliorates the general condition in the State if well performed; it may only aggravate the problem under bad management and inefficient methods. Hence if the State is to know in any complete measure the real number of dependents in the State, if the State is to know what methods are being used and which methods are proving most effective thruout the State, it must turn for much of its information to private institutions. The great bugbear of State charity work is the one word "investigation" which is used so frequently in all statutes creating State boards. The word has a sinister sound, which frightens off leaders in private philanthropy whose assistance is imperative. It seems to imply that prosecution for misuse of funds, criminal mismanagement, etc., will follow. In only a few States have private agencies come to realize that reasonable investigation, or rather inspection, by the State is a necessity if the State board is to pretend to cope with the fundamental problem before it. As many charity authorities, including directors of private agencies, have urged, no institution which is properly conducted has anything to fear from such an "investigation", and those improperly or criminally conducted ought to be investigated in the strictest sense of the word. However, the aim of investigation by a State board is not primarily to prosecute for abuses, but to seek information of a statistical nature. As in any other field of activity, a State charity board must be able to gather at first hand statistics concerning the actual existing conditions and their causes before it can hope to apply the proper remedies. Its secondary aim of remedying abuses is but temporary and transitory. Even if all institutions were properly conducted there would still be need of State supervision.

This is in the main the gist of the argument for the supervision of any institution by a State board. So far it has found expression in definite legislation only regarding county and



municipal institutions, institutions supported wholly or in part by the State, and institutions for the insane. In all of these fields, however, there have been additional reasons of considerable force. In strictly private institutions it has as yet found expression in less than ten States. Illinois, Massachusetts, and Michigan, however, have given their supervisory boards considerable power in the visitation of children, while the Massachusetts board in general has wider powers in the field of private charity.

In connection with the inspection of institutions has also come a demand for greater care in creating private institutions in this field. It has been claimed that the State shows much concern as to who shall be allowed to become a plumber or horse doctor, but bothers itself but little concerning the qualifications of those endeavoring to care for a large part of its dependent class. Hence in Illinois, Indiana, Colorado, Massachusetts, and Kansas the State board has been given power to license certain classes of institutions, including children's home-finding associations, maternity hospitals, etc., as well as institutions for the insane. To pass upon the articles of incorporation before the same are placed before the legislature is but another step in this direction which has been taken by some States.

To sum up, it may be said that the only real controversy today is over the supervision of private institutions, with increasing sentiment favoring such supervision, but with comparatively little legislative action on the subject. At the bottom the whole matter seems to rest on the personnel of the State board. Only in States where the members of the State board have the confidence of private agencies is such supervision possible, or for the moment even desirable in practice. The most momentous question in the whole field of charity today seems to be just this,—how to secure the active coöperation of all agencies at work in the charity field, and particularly how to bring members of State boards and private workers into harmonious action. After all, in the practical experience of State boards, it seems that it is not the law but the men that count.

## IX. CONCLUSION

It must be quite evident, from what has already been said, that it would not be the part of wisdom to attempt to be dogmatic in one's conclusions concerning the relative merits of the three types of systems. Since each system is working successfully in one or more States, and since the success of each system and the character of the work done by each board depend so much upon the particular conditions in each State and upon the character of the members of the various boards, it is well-nigh impossible to point to any one system now in operation and declare that it is the best. However, it has been possible to set forth certain facts and tendencies in the past and in the present State supervision and administration of charities, and these facts and tendencies seem to point inevitably towards the dual system as the final solution of the problem, at least so far as the problem may be solved by any existing scheme of supervision or administration by boards or commissions.

The first fact that seems to be self-evident is that the idea of centralizing or consolidating the administrative side of State institutions is now in great favor and is increasing in popularity. Since 1900, out of thirty boards created, nineteen were administrative, only eleven supervisory boards being established in that time. The figures are much more striking if we consider the period within the past five or six years. Since 1908 only five supervisory boards have been established in what is strictly the field of charitable institutions. During the same period fifteen administrative boards have been created in that field.<sup>89</sup> (Some of these administrative boards created a dual system, of course.) Again in the governors' messages for 1915 the governors of four States<sup>90</sup> definitely urged the creation of an administrative board to have full control over State institutions. In only one

<sup>89</sup> Since 1900 boards were created as follows: supervisory boards in Maryland (1901), Nebraska (1901), California (1903), Louisiana (1904), Minnesota (1907), Oklahoma (1907), Virginia (1908), Delaware (1909), Maine (1913), South Carolina (1915), Massachusetts (1916); administrative boards in Minnesota (1901), New York (1901), Washington (1901), Arizona (1901), Kentucky (1908), West Virginia (1909), Illinois (1909), Oklahoma (1909), North Dakota (1911), California (1911), Ohio (1911), Rhode Island (1912), New Hampshire (1913), Vermont (1914), Arkansas (1915), Colorado (1915), New Hampshire (1915), Oregon (1915), Tennessee (1915).

<sup>90</sup> Arkansas, New Hampshire, New Mexico, and Tennessee.

State<sup>91</sup> did the governor recommend the creation of a supervisory board, altho the governor of Missouri in his message opposed the board of control idea. Hence there is clearly a very definite and positive tendency at present toward the centralization of the control of State institutions.

To look upon this tendency as one merely applying to State charitable institutions, however, is to miss the real point in the whole argument for the administrative boards. The present movement towards a central board of control in this field of State activity cannot be understood apart from the general movement now usually designated by the name of "efficiency and economy" which seems to have taken the popular mind by storm. Whether it may be said that this movement had its origin in the tendency towards the consolidation of the boards controlling State institutions or not, certainly the tendency towards centralization in State charitable institutions is now a part of the efficiency and economy movement. Historically this was not so, for boards of control were established long before this modern watchword was invented. But from now on in the charities field the effect of this general movement will probably be felt. The administrative board, already a favorite with recent legislatures, bids fair to ride triumphantly forward on the crest of this wave.

Now this does not mean that the administrative system will be the system adopted. The keynote of the efficiency and economy movement is the consolidation of existing boards; in the field of charities this would mean only the substitution of a single board of control for the many separate boards of trustees for the State institutions. Where there was no supervisory board in existence, that would mean the administrative system. Where the existing supervisory board was unpopular, it might mean the abolition of the supervisory board and the adoption of the administrative system. But where the existing supervisory board had been doing good work the resulting system would undoubtedly be the dual system. That was the case in Illinois, tho the supervisory agency was made over into a Charities Commission. The same was true of Ohio, where an administrative board was created in 1911 without abolishing the supervisory agency. The testimony of the past few years is all in that direction.

<sup>91</sup> Nevada.



Of the administrative boards mentioned above (note 89) as created since 1900 not one was established at the expense of a supervisory board. The boards were created either in States where there had hitherto been no State board, or in States where the new board created a dual system. There would seem to be one exception, but that only bears out the case the more fully. When the Board of Control was established in Minnesota in 1901, the supervisory board was abolished, only to be re-established in 1907. Wisconsin is the only State which has ever abolished a supervisory board (in 1891) without later re-establishing one of the same kind; that is, it is the only State which has replaced the supervisory board with an administrative board without later creating a dual system.<sup>92</sup> What better argument can there be in favor of the retention of the supervisory board than this fact taken from the history of States that have once felt the influence of the supervisory board?

If then the present tendency towards centralization and consolidation means the creation of central administrative boards, and does not necessarily or probably mean the abolition of supervisory boards, the inevitable result seems to be the dual system.

If we look at the situation from a different angle, it will even appear that as matters stand at present, the principle of the dual system is even now the one most generally accepted in practice. The supervisory system, itself, involves the principles of the dual system. There is separate administration and supervision. The only difference between the two systems is that in the supervisory system the administrative side is entrusted to many local boards, while in the dual system administrative control is centralized under a single State board, and the dual system proper exists only where there are two central boards. Since the essential principle underlying both systems is the same, the fundamental question is simply whether it is better to have many boards, one for each institution, or to centralize all administrative control in a single board. In the administrative system there is no ques-

<sup>92</sup> Oregon is the only State which has had a supervisory board and has abandoned it and returned to the decentralized, unsupervised, trustee system. The supervisory board was created there in 1891 and was abolished in 1893 for political reasons. Oregon is now, however, of the administrative type.

tion whether the central board should be abandoned and the old boards of trustees resurrected. No State that has had a central administrative board has ever abandoned it. But there may be in the future a very serious question whether a supervisory board should not be created in addition to the administrative board and the dual system be established.

There is one question which has arisen recently in connection with the administrative board of either the administrative or dual type, which is worthy of further note. Is it necessary that members of administrative boards should themselves receive a large salary and devote all their time to the work? This question, tho of relatively little importance in the past, may become of importance in the future, owing to the attitude of many charitable workers. The Rhode Island State Board of Charities and Corrections was the first administrative board to be created in the United States (1869). Tho in name and composition it followed the supervisory type, yet it was given administrative functions, and was in reality a board of control. Following the supervisory type in many ways, however, it was a large board of nine, and no compensation was paid the members. Until 1915 this was the only administrative board in the United States whose members did not receive compensation. The New Hampshire act of 1915 which abolished the board of control and substituted a board of trustees is, in consequence, a distinctly new departure. Since the New Hampshire act was the result of popular indignation owing to the removal by the board of control of a competent superintendent of the State hospital, for political reasons, it remains to be seen whether the experiment will prove of value. Charity workers are still claiming that the mere fact that members of boards of control are paid large salaries inevitably means the introduction of the spoils system into State institutions. However, the central administrative board, tho unpaid, has large powers of appointment and removal, and of controlling contracts and the purchase of supplies. It would seem that these powers would present a sufficient inducement for the entrance of partisan politics, whether the members of the central board received salaries or served without compensation. The roots of the spoils system lie far deeper than the salary of a State board. To eradicate partisan politics there is needed rigid



civil service requirements and the development of public sentiment which will demand that the State institutions be kept out of politics. These evils are no respecters of boards or systems, and can be found as easily where the supervisory system exists as where the administrative board holds sway. The situation in New Hampshire, however, is of considerable interest as an experiment in an hitherto unexplored field.

But what can be said of the dual administrative system which was set forth on page 45? Not only is there such a system in several States at the present time, but the tendency seems to be in the direction of increasing the number. In 1915 seven governors<sup>93</sup> in their messages advocated the creation of purchasing agents to have charge of the purchase of supplies for the State institutions. The movement, tho recent, seems to be gaining in popularity.

There is little information as yet upon which one may be justified in basing a positive opinion. But there seem to be two phases to this new tendency. One is towards the creation of State purchasing agents who are not primarily over the State institutions and whose function is to systematize the purchase of all State supplies and to secure to the State the advantages of large-scale buying. The other is the more dangerous form, where the finances of the institutions are divorced from the other matters of administration and a fiscal agency over the State institutions has discretionary power in the control of finances. The former may be advantageous. Certainly the California Board of Control has proved a saving to the State. The latter has not yet proved to be a harmonious element in the State system. Oregon has abandoned a purchasing board for a board of control, and New Hampshire has subordinated the purchasing agent to a general administrative board. The only definite investigation on the subject is the report of Mr. Wright already many times referred to, and that shows that there are certainly dangers in the system. It may well be that as the experience of the existing boards becomes available the proper powers and duties of the latter may be sufficiently determined so that it will fit into the system without the present friction. The State purchasing agency may find more ready acceptance, but it is difficult to see the need for such a separate agency under either the

<sup>93</sup> Arizona, California, Connecticut, Missouri, Nevada, Ohio, and South Dakota.

administrative or dual system. Under the supervisory system such a board or agency might act as a substitute for a central board with complete powers of control.

It has been claimed that the difference between the administrative and supervisory boards is more theoretical than real, and that may often be the case in actual practice. But if we analyze the situation we will find that this results not from any generally accepted idea that such a condition is the best, but merely from force of circumstance. Where the administrative board is the only existing central agency it will, and must inevitably, take on supervisory powers, for supervision by some State central agency is now recognized as essential to the State's charity work. On the other hand, where the supervisory board is the only State central agency it will quite naturally take on more and more executive or administrative functions. In neither case is this so much the result of a preconceived idea as it is of mere immediate expediency. In the past this has been caused by the idea long prevalent that it would not be practicable to have two State central boards existing, one exercising administrative, the other supervisory functions. The tendency toward the dual system is growing stronger today, and that old theory of the antagonism of the two boards is fading slowly away.

## Appendix A.—A Descriptive Digest of State Laws

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**Alabama.** Alabama belongs primarily to the trustee type, having no general State supervision of charity, with the management and control of each institution in the hands of a separate board of trustees. For penal institutions, however, it has two methods of supervision and inspection. In this field, Alabama is of the Indiana type. A board of three persons, styled the Board of Inspectors of Convicts, has general supervision and control of State and county convicts. A single official, styled State Prison Inspector, inspects twice a year every county jail, almshouse, and every municipal jail or prison; he has authority to order such jails, etc., to be put in proper condition, sanitary in particular, and may condemn unsanitary jails.—*Code*, Vol. iii, § 6479; *Acts*, 1911, p. 356.

**Arizona.** Arizona is of the Iowa type, but its board is ex officio. A board of three, consisting of the governor, auditor, and one citizen, styled Board of Control, has full charge of all charitable, penal, and reformatory institutions, as well as of the capitol buildings and grounds. The board appoints certain officials, receives bids for supplies for the State institutions, and for all purchases exceeding \$100 in amount must award contracts after competitive bidding. The governor alone, however, appoints the heads of institutions. Not more than two of the members shall belong to the same political party. The citizen receives an annual salary of \$1,800.—*Revised Statutes*, 1913, § 4452.

**Arkansas.** Arkansas is of the Iowa type, but with two State boards dividing the work of administration. A board of three persons, styled State Board of Penitentiary and Reform School Commissioners, has full charge of the State farm, State penitentiary, and reform school. Its members serve for six years and receive an annual salary of \$3,000. The board purchases supplies by sealed bids and makes detailed financial statement thru the State auditor. In 1915 there was created a Board of Control of three members, with a salary of \$2,500, to have charge of the State institutions for the blind, deaf, nervous diseases, and the soldiers' home. This board replaced the former boards of trustees which had charge of the same institutions. The latter law provides for supervision or investigation at any time by the appointment by the governor of a suitable individual to examine the affairs of any or all the State charitable institutions. This individual then has rather full powers to issue subpoenas, administer oaths, and take depositions. The work of the State boards in Arkansas is confined to strictly State institutions.—*Acts*, 1911, p. 154; *Acts*, 1913, pp. 213-257; *Acts*, 1915, p. 404.

**California.** California is of the dual type and there are three main State boards: one purely fiscal, the other two dividing the work of supervision. A board of three persons, styled Board of Control, is empowered to examine the books of the different institutions, commissions, bureaus,



and officers of the State at least once a year, and to inspect buildings and equipment of institutions. The board examines and approves every claim against the State before such claim goes to the comptroller; counts the money in the State treasury once a month; invests certain specified sums; and in general supervises the financial policy of the State. It has a department of accounting and strictly enforces a uniform system of accounting for all State officials. The members of the board shall not engage in any private business requiring their personal attention between the hours of nine o'clock a.m. and five p.m. of each day, excepting holidays, during their term of office. Each member receives a salary of \$4,000, and holds office at the pleasure of the governor.—*Statutes*, 1911, Ch. 349, p. 590.

A board of six persons, styled State Board of Charities, investigates and examines charitable, penal, and correctional institutions of the State, counties, and towns, and public officials responsible for public funds for charitable purposes. It must approve all plans for buildings and must investigate all charitable institutions receiving State aid, and makes a biennial report to the legislature. Women may be appointed to the board. Members receive no compensation.—*Statutes*, 1911, p. 1334.

An ex officio board of five persons consisting of the general superintendent of State hospitals, secretary of State board of health, and three members of the State board of examiners, styled State Commission in Lunacy, has administrative supervision of the insane institutions of the State, and examines all public and private institutions receiving insane and other incompetent persons. It meets with the heads of institutions for a State conference at its discretion. It has fiscal supervision of the State hospitals, but each institution still has a separate board of managers or trustees.—*Statutes*, 1909, p. 56.

California has also a prison commission of five members which appoints officers, fixes salaries, contracts for supplies, and awards to the lowest bidder. It is styled a State Board but it is really a board of trustees having charge of the State prison.—*Statutes*, 1907, p. 585.

**Colorado.** Colorado now belongs to the dual system. Prior to 1915 the chief State board was the State Board of Charities and Corrections, a supervisory board, which investigated the whole system of public charities and corrections, examined the condition and management of all prisons, jails, reformatories, public and private retreats and asylums for insane which derived their support wholly or in part from State, county, or municipal appropriations; and could inquire into complaints regarding the conduct and management of private eleemosynary associations, societies, and corporations operating and existing within the State, and it had power to issue and revoke licenses for such institutions. The members of the board serve for six years without compensation.

There is also in each county a board of six persons, three of them women, who constitute a board of county visitors to inspect all charitable and correctional institutions supported by county or municipality, and private asylums in the county.

In 1915 there was created the Colorado Board of Corrections to have full control, management, and supervision of the Insane Asylum, State



Penitentiary, and State Reformatory. The board consists of three commissioners who serve six years at a salary of \$1,200. Not more than one commissioner may reside in the same congressional district, and not more than two at the same time shall be members of the same political party. This board is given the duties and powers of the former State Board of Lunacy Commissioners and the Board of Penitentiary Commissioners, which, tho called State boards, had been virtually boards of trustees for the separate institutions.—*Annotated Statutes*, 1912, Ch. 27, §§ 603, 615; *Session Laws*, 1915, Ch. 52, p. 153.

**Connecticut.** Connecticut is of the Indiana type. A board of five persons, two of whom are women, styled State Board of Charities, inspects all almshouses, homes for neglected or dependent children, asylums, hospitals, and all institutions for the care or support of the dependent or criminal classes, and inspects all institutions in which persons are detained by compulsion to ascertain whether commitment and treatment have been proper, and may correct any abuses found to exist in such manner as not to conflict with any personal, corporate, or statutory rights. Members serve for four years without compensation. The management of each institution is vested in separate boards of trustees.—*General Statutes*, 1902, Ch. 173, p. 730.

**Delaware.** Delaware is of the Indiana type. A commission of two, one a woman, styled Board of Supervisors of State and County Institutions in Newcastle County, visits State, county, and municipal institutions in that county, where persons are restrained of their liberty, and investigates treatment of inmates. The two commissioners receive a salary of \$25 per annum with no further allowance for traveling expenses. An amending act of 1915 revised the system, placing greater emphasis on financial matters.

A commission of seven, styled Delaware Commission for the Blind, has supervision and control of the education, training, and welfare of the blind residing in the State.—*Laws*, 1909, Ch. 72, p. 138; Ch. 73, p. 140; *Laws*, 1915, Ch. 69, p. 168.

**Florida.** Florida is of the Iowa type, but its board is ex officio. A board of commissioners of State institutions, consisting of the Governor and Cabinet, has supervision and administration of the Florida Hospital for Insane and State prison, and secures supplies for the latter thru bids and contracts; it also contracts for State printing and supervises alterations and repairs on the State capitol.—*Digest*, 1902, p. 12; Constitution, Art. IV, § 17.

**Georgia.** Georgia is another State of the Iowa type which has only a prison commission. This board consists of three citizens appointed by the governor, and has complete control of State convicts and the Georgia State Reformatory, and supervises the other convict camps.—*Code*, 1911, Vol. ii, §§1185-1241.

**Idaho.** Idaho belongs to the trustee type and has no State board of control or supervision. The State board of examiners examines the books of the institutions. Otherwise all responsibility for the State institutions rests with separate boards of trustees. The Board of State Prison Com-

missioners is merely a board of trustees over the State prison.—*Revised Code*, 1908, § 146, p. 237; *Penal Code*, § 8460; *Session Laws*, 1911, Ch. 163, p. 560.

**Illinois.** A board of five persons, one an expert in treatment of insane, styled Board of Administration, has executive and administrative supervision (control) over all State charitable institutions; hospitals for insane, feeble-minded, and epileptic, training schools for boys and for girls. It inspects and investigates the institutions for poor relief, almshouses, children's home-finding societies, orphanages, etc., and licenses all institutions for the treatment of mental or nervous diseases. It inspects county and city prisons and other institutions for confinement. The board has close fiscal supervision and control of all State charitable institutions thru its fiscal supervisor.

A board of five persons, styled the Charities Commission, investigates the whole system of public charitable institutions of the State, examining equipment, management, and policy of each, and may inquire into the management of insane hospitals and any place where a person is detained for treatment of nervous diseases. It also inspects county jails, city prisons, workhouses, etc., to collect statistics concerning inmates, and visits each State institution at least quarterly. The commission may inquire at its discretion into the equipment, management, and policies of all institutions and organizations coming under the supervision and inspection of the Board of Administration. It maintains a Bureau of Criminal Statistics. Not more than three of the members in either board shall be from the same political party, and members of the Charities Commission receive no compensation. The members of the Board of Administration receive an annual salary of \$6,000.—*Laws*, 1912, p. 66.

Illinois has also a Board of Prison Industries of Illinois which is composed of the commissioners of the penitentiaries of Joliet and at Chester, and the board of managers of the Illinois State Reformatory at Pontiac. Their power is entirely over the labor of prisoners.—*Revised Statutes*, 1913, Ch. 108, p. 1845, § 75.

**Indiana.** A board of six persons, styled Board of State Charities, investigates the whole system of public charities and correctional institutions of the State, and examines into the conditions of prisons, infirmaries, public hospitals, and asylums, and must approve plans for new jails and infirmaries.

A board of six persons in each county, styled Board of County Charities, two of whom are women, inspects county poor asylums, jails, orphans' homes, lock-ups, and other charitable or correctional institutions receiving any support from public funds in the county, and reports to the State Board of Charities.

There is also in each county a board of children's guardians of six members, three of them women, and every member a parent, which has the care and supervision of neglected and dependent children under fifteen years of age. It may take under its control children neglected or cruelly treated by parents, juvenile delinquents, or truants, and may commit children to orphan asylums.—*Burns' Annotated Statutes*, 1914, §§ 3665-3678, 9812a,b.

**Iowa.** A board of three persons, styled Board of Control of State Institutions, has full power to manage and control the soldiers' home, State hospitals for insane, schools for blind, deaf, feeble-minded, and industrial schools, soldiers' orphans' home, and State penitentiaries. The board has power of inspecting private and county institutions for the insane, and State educational institutions, and its fiscal supervision is emphasized. Members of the board serve for six years and receive an annual salary of \$3,000. Not more than two shall be from the same political party.—*Supplement to Code, 1907, §§ 2727-a1.*

**Kansas.** Kansas is of the Iowa type. A board of three persons, styled Board of Control of State Charitable Institutions, has full control of the industrial schools for girls and boys, State hospitals, schools for blind, deaf, and feeble-minded, and soldiers' orphans' home. The members of the board are trustees for these institutions, and have full power of inspection, establish a uniform system of accounting, and purchase supplies. The board also inspects and licenses private asylums, and all private institutions of the State receiving State aid are subject to its visitation and supervision. Members serve for four years and receive a salary of \$2,500 per annum.—*General Statutes, 1909, § 7894; Laws, 1911, Ch. 46, p. 77.*

The board of three persons, styled a State Board of Corrections, are by virtue of the office directors of the State penitentiary, managers of the State industrial reformatory, managers and trustees of State reformatory schools for boys and for girls, and have full power over each institution. They receive \$1,200 and expenses.—*Laws, 1913, Ch. 289, p. 480.*

A board of three persons, styled Board of Administration, has power of management and control over certain State educational institutions, including the schools for deaf and blind.—*Laws, 1913, Ch. 287, p. 469.*

**Kentucky.** Kentucky is strictly of the Iowa type. A board of four persons, styled Kentucky State Board of Control for Charitable Institutions, has full management and control of the three asylums for the insane and the feeble-minded institute, and examines them financially and otherwise, purchasing supplies by bids, etc. Two members shall always be selected from the political party which polled the largest number of votes in the last preceding State election, and two members from the political party casting the next largest number of votes. Members serve for four years with a salary of \$2,500 per annum.—*Acts, 1906, Ch. 18, p. 60; Acts, 1908, Ch. 28, p. 72.*

**Louisiana.** Louisiana is of the Indiana type. It has a board of six members, styled State Board of Charities and Corrections, of which the governor is a member and chairman. The members serve for six years without compensation. The board's duties are strictly visitorial without administrative or executive power. It visits and inspects all State, parish, or municipal institutions of a charitable, eleemosynary, correctional, or reformatory character.—*Acts, 1904, p. 361.*

**Maine.** Maine established a State Board of Charities and Corrections in 1913. In the main this board follows the Indiana type. Private institutions, by written request, may come under the supervision of the board.



Otherwise supervision is confined to institutions receiving public aid. The board is given executive power in the placing out of children.—*Public Law*, 1913, Ch. 196, p. 242.

**Maryland.** Maryland is of the Indiana type. A board of seven discreet persons, at least two not residents of Baltimore, styled Board of State Aid and Charities, investigates the whole system of State aid to public and other institutions receiving such aid in the State, and for this purpose investigates the condition and management of such institutions and reports to the legislature. Members serve for two years without compensation, and shall not be interested in contracts, nor hold official position in an institution supervised.—*Annotated Code*, 1911, Vol. ii, p. 1960.

**Massachusetts.** Massachusetts is essentially of the Indiana type. A board of nine persons, styled State Board of Charity, has general supervision of the State hospital, State farm, industrial schools for boys and for girls, and the State sanatorium. The board is in two divisions: (1) Division of State adult poor; (2) Division of State minor wards; and has considerable executive authority in the transfer of paupers. Members serve for five years with no compensation. All charitable institutions incorporated in this State make annual reports to the board, and the board visits almshouses and advises overseers concerning plans for new buildings, etc.—*Revised Laws*, 1902, Vol. i, p. 730; *Supplement*, 1902-08, pp. 649-651.

Massachusetts has made several experiments with its board over the insane. The latest change was in 1916. The State Board of Insanity, hitherto existing, was abolished, and a Commission on Mental Diseases was established. This consists of a director and four associate members, appointed by the governor, and removable by him for cause. The director and at least two of the associate members must be physicians and experts in the care and treatment of the insane. The director receives a salary of not over \$7,500. The associate members serve without compensation. The commission has general supervision of all public and private institutions for insane, feeble-minded, or epileptic persons, but when so directed by the governor, may assume the powers of the board of trustees of any State institution under its supervision in any matter relative to the conduct or management thereof.—*Revised Laws*, 1902, p. 750; *Supplement*, 1902-08, p. 670; *General Laws*, 1916, Ch. 285.

A board of five persons, two of them women, styled Board of Prison Commissioners, has general supervision of State prison, reformatory, jails, and house of correction. They appoint the wardens, make rules for the purchase of supplies, etc. They serve for five years and the chairman alone receives a compensation of \$4,000. This board is of the Iowa type.—*Revised Laws*, 1902, Vol. ii, p. 1868.

**Michigan.** Michigan is of the Indiana type. A board of four persons, styled State Board of Corrections and Charities, has merely power of visitation over charitable, penal, pauper, and reformatory institutions, and may not interfere with the board of control of the State prison or



board of control of the reform school, or boards of trustees of other institutions. Members of the State board receive no compensation.—*Statutes*, 1912, Vol. v, Ch. 432, p. 5934, §§15510-15523.

**Minnesota.** Minnesota is of the Illinois type. A board of three, styled Board of Control, has exclusive management of the State prison, State reformatory, State training schools for boys and for girls, school for feeble-minded, State hospitals and asylums for the insane, and State sanatorium for consumptives. It has slight fiscal supervision of State educational institutions and establishes uniform system of accounts at the institutions under its control. It investigates the whole system of public charities and all charitable and correctional institutions of the State, especially prisons, jails, infirmaries, public hospitals, and asylums, and examines their condition and management. It approves new plans for jails, lock-ups, etc. Members receive a salary of \$4,500.—*General Statutes*, 1913, Vol. i, p. 906, §§4001-4139.

A board of six persons, styled State Board of Visitors, studies the whole subject of care and management of charitable and correctional institutions. It has power to examine persons and papers. The governor is ex officio member. The other members serve for six years with no compensation. Not more than three shall be from the same political party. The governor may order an investigation by the board at any time and the board then has the power to summon witnesses and administer oaths.

Members of the board of control must devote their entire time to their duties and shall hold no other lucrative office. Purchase of supplies is by an estimate system, but each institution makes its own contracts.—*General Statutes*, 1913, p. 930, §§ 4139-4142.

**Mississippi.** Mississippi is of the trustee type, having no State supervisory board. However, an ex officio board, consisting of the secretary of State, auditor of public accounts, and the attorney-general, styled Board of Public Contracts, has sole power and authority to make contracts for printing, fuel, and repairs of all public institutions except the educational and of all State offices and departments.—*Code*, 1906, § 284.

**Missouri.** Missouri is of the Indiana type. A body of six persons, styled State Board of Charities and Corrections, two of whom are women, investigates the whole system of public charities and corrections, examines the condition and management of all prisons, jails, almshouses, reformatories, reform and industrial schools, hospitals, infirmaries, dispensaries, orphanages, and all public and private retreats and asylums deriving their support in whole or in part from State, county, or municipality. Members receive no compensation.

A board of county visitors of six persons keeps fully advised of the conditions and management of all corrective institutions supported wholly or in part by county or municipal taxation, or under county or municipal control, especially county jails, almshouses, and municipal prisons. Each county board makes an annual report to the State Board of Charities and Corrections.

A municipal charity board is also provided by State legislation for cities of more than 50,000, and less than 150,000 population. This board

has power to receive and disburse donations for relief of poor, and has exclusive control of all public funds appropriated by city or county for outdoor or temporary relief or aid to indigent, helpless, or poor.—*Revised Statutes*, 1909, §§ 1316-1321, 1329-1332.

**Montana.** Montana is somewhat of the Iowa type. There is a State Board of Commissioners for the Insane, consisting of the governor, secretary of State, and attorney-general, which has the management, control, and supervision of the State insane asylum and of the State hospital for inebriates. As first constituted it was merely a board of trustees. The law has since been strengthened so that the board is more nearly a State board of control for insane institutions and dependents outside of the institutions. There is also a Board of Commissioners of Penal Institutions, with the same personnel.—*Revised Penal Code*, 1907, §§ 9716, 9746-9756; *Laws*, 1911, Ch. 131, p. 398; *Laws*, 1913, Ch. 57, p. 110.

**Nebraska.** Nebraska belongs to the dual type. In 1913 there was created a Board of Commissioners of State Institutions, which took over the powers formerly exercised by the Board of Public Lands and Buildings over State institutions. The members devote their whole time to the work, and control the schools for the blind and deaf, industrial school, institutions for the feeble-minded, orthopedic hospital, soldiers' and sailors' home, hospitals for the insane, State penitentiary, and all charitable, reformatory, and penal institutions that shall be established by law and maintained by the State; appoint the heads of institutions and a few of the more important under officials; and must investigate each institution without notice at least once in six months. The board has power to summon witnesses. Supplies are purchased by the board except minor purchases at their discretion, and monthly estimates are required.—*Laws*, 1913, Ch. 179, p. 535.

An ex officio Board of Charities and Corrections consisting of the governor, commissioner of public lands and buildings, and State superintendent of public instruction inquires into the whole system of public charities and methods and practices of correctional institutions of State and counties, and inspects prisons, jails, asylums, reformatories, etc. It also approves plans for new jails and lock-ups.—*Annotated Statutes*, 1913, §§ 10318-10322, p. 3265.

**Nevada.** Nevada is of the Iowa type. The governor, secretary of State, and attorney-general constitute a Board of Prison Commissioners which has administration of the State prison, and appoints the warden. It also acts as a board of examiners with powers to examine all claims against the State.—*Compiled Laws*, 1900, §§ 1420, 2029.

**New Hampshire.** New Hampshire belongs to the dual system. There is a board of five persons, styled State Board of Charities and Corrections, which inspects all State and county charitable and correctional institutions, except the State prison and the asylum for the insane at Concord.

In 1913 there was created a Board of Control with power over the State hospital, industrial school for feeble-minded, and State sanatorium, to take the place of the former separate boards of trustees. "Two capa-

ble persons" together with the governor, secretary of State, and the State purchasing agent were to constitute the board. Owing to the action of this board in removing a capable superintendent of the State hospital, the board was abolished in 1915, and a Board of Trustees of State Institutions was established in its place. This board has charge of the same institutions as the former board, with the addition of the State prison. It consists of ten members who receive only actual and necessary expenses. They employ a competent person to act as business manager of State institutions, and fix his salary, subject to the approval of the governor and council. The board also appoints a purchasing agent.—*Public Statutes*, 1901, p. 278; *Laws*, 1911, Ch. 229, p. 289; *Laws*, 1913, Ch. 140, p. 650; *Laws*, 1915, Ch. 176, p. 249.

**New Jersey.** A Commissioner of Charities, appointed by the governor, inspects charitable and correctional institutions of the State that receive funds from the State treasury, and plans and specifications for State charitable buildings are under his direction. He receives a salary of \$4,000, and may be aided in investigations by a committee of two appointed by the governor.—*Compiled Statutes*, 1910, Vol. i, p. 453.

**New Mexico.** New Mexico is of the trustee type, having no supervision by a State board. The traveling auditor and bank examiner are empowered to install a uniform system of accounting for all county officials and institutions, and for State penal, reformatory, educational, or charitable institutions.—*Laws*, 1912, p. 105.

**New York.** New York is of the dual type. A board of twelve members, styled State Board of Charities, inspects and maintains general supervision of all institutions, societies, or associations which are of a charitable, eleemosynary, correctional, or reformatory character, whether State or municipal, incorporated or not, except for the insane and reformatory for adult males convicted of felony. Subject to approval by a justice of the supreme court, it may issue orders to such institutions concerning management and treatment of inmates.—*Consolidated Laws*, 1909, Vol. v, p. 5377.

A Fiscal Supervisor of Charities, appointed by the governor for five years, with a salary of \$6,000, examines the condition of all buildings, and financial arrangements, books, and accounts of charitable institutions. He controls the purchases of supplies by an estimate system.—*Laws*, 1909, Vol. v, p. 5386; *Supplement*, 1911, p. 733.

A board of three members, styled State Hospital Commission, has general oversight and fiscal control of all State hospitals for the insane, and supervises all other institutions, public or private, where insane are confined. One member shall be a reputable physician, a graduate of an incorporated medical college of at least ten years' actual experience in the care and treatment of insane. One shall be a reputable attorney and counsellor-at-law in the courts of the State of not less than ten years' standing. The medical commissioner is chairman or president and receives a salary of \$7,500. The others receive \$5,000 each, receiving in addition \$1,200 for traveling expenses. Each institution, however, has a separate board of managers or trustees.—*Consolidated Laws*, 1909, Vol. ii, p. 2441.



A board of seven, styled State Commissioners of Prisons, has visitation and inspection of all institutions for detention of sane adults charged with or convicted of crime, except reformatories which are under the State Board of Charities. There is also a State board of managers of reformatories, consisting of seven members who have administrative control over this group of State institutions. By Article V, Sec. 4, of the Constitution there is a Superintendent of State Prisons who has the superintendence, management, and control of State prisons, and appoints agents, wardens, physicians, and chaplains.—*Consolidated Laws*, 1909, Vol. iv, pp. 4301, 4357.

**North Carolina.** North Carolina is of the Indiana type. A board of five persons, elected by the General Assembly, styled Board of Public Charities of the State of North Carolina, investigates and supervises the whole system of charitable and penal institutions and makes recommendations. It may visit and inspect county jails and almshouses, and may, at its discretion, transfer insane to the State hospital. Members receive no compensation.—Pell's *Revision*, 1908, p. 391.

**North Dakota.** North Dakota is of the Iowa type. A Board of Control, of three members selected from the two largest parties, has full power to manage, control, and govern the State hospital for insane, State penitentiary, asylum for the blind, school for deaf and dumb, school for feeble-minded, State reform school, and State tuberculosis sanatorium. Members serve for two years and receive a salary of \$3,000. The board holds quarterly conferences and makes rules for purchasing supplies. Each institution has a contingent fund of \$3,000 for emergencies. The board installs a uniform system of accounts and has full fiscal control, but is in turn subject to examination by the State auditing board. There is no supervision outside of State institutions.—*Laws*, 1911, Ch. 62, p. 86; *Laws*, 1913, Ch. 55, p. 63.

**Ohio.** Ohio is of the Illinois type. A Board of Administration of four members, serving for four years, has full power to manage and govern all State charitable and correctional institutions. Each member receives as compensation \$5,000 per annum. A Board of State Charities of seven members investigates the whole system of public benevolence and correctional institutions, and inspects conditions and managements of institutions of State, county, and municipality. It must approve plans for new jails. Members of the administrative board shall be selected so that the board will have as far as possible in its membership the advantage arising from a special study, knowledge, or experience regarding the proper care and treatment to be afforded at institutions of the kind governed by it. Ohio has also a Commission for the Blind, of six members, which acts as a bureau of information and industrial aid for the blind. There is a board of six county visitors in each county, which inspects all charitable and correctional institutions supported in whole or in part from county or municipal funds.—*General Code*, 1910, §§ 1349-1369, 2971-2976; *Laws*, 1913, pp. 173, 174; *Laws*, 1911, p. 211.



**Oklahoma.** Oklahoma is of the dual type. A Commissioner of Charities and Corrections, an elective office provided by the constitution, investigates the entire system of public charities and corrections, examines into condition and management of all prisons, etc., and all public or private retreats and asylums deriving their support wholly or in part from the State. In 1909 there was created a State Board of Public Welfare, of three members, not more than two from the same political party, who receive a salary of \$3,000. This board has charge of the construction, repair, maintenance, insurance, and operation of all buildings owned, used, or occupied by or on behalf of the State; it has authority to purchase all materials and perform all other duties necessary in the construction, repair, and maintenance of such buildings; it has the custody and control of all State property except military stores and supplies. This board resembles the Board of Control of California and the Board of Control and Supply of Rhode Island much more than it does the strictly administrative board of Iowa or Illinois. Its control over charitable institutions lies in its power over contracts for supplies for all State institutions.—Constitution, Art. VI, §§ 27-30; *Compiled Laws*, 1909, pp. 1468, 1469, §§ 7384-7395; p. 1738, §§ 8658-8673.

**Oregon.** Oregon is of the administrative type. In 1911 a State Purchasing Board was created, consisting of the governor, secretary of State, and State treasurer, who employed a secretary at a salary of \$2,500. In 1913 this board was abolished and the Oregon State Board of Control was established to manage the State hospitals, State institution for the feeble-minded, training school, penitentiary, school for blind, school for deaf, tuberculosis hospital, State soldiers' home, and the capitol and Supreme Court buildings. The personnel of the board was the same as that of the State Purchasing Board which it replaced.—*General Laws*, 1911, Ch. 126, p. 1701; 1913, Ch. 78, p. 120.

**Pennsylvania.** Pennsylvania is of the Indiana type. It has a Board of Public Charities of five persons, which has power to examine the condition of all charitable, reformatory, or correctional institutions, financially and otherwise, their method of instruction, government, and management of their inmates, official conduct of trustees and officials. The board visits all such institutions receiving State aid, and also city and county jails, prisons, or almshouses. The board must approve new plans for prisons, etc., and appoint visitors in each county to aid the board. It may remove insane to State institutions. The board establishes psychopathic wards at the insane hospitals.—*Laws*, 1913, p. 149; *Purdon's Digest* (13th Ed.), Vol. i, pp. 588-592.

**Rhode Island.** Rhode Island is of the dual type but has only a limited State supervisory board. A body of five qualified electors of the State, styled Board of Control and Supply, purchases and makes all contracts for the purchase of supplies for all State charitable institutions, and has entire supervision and control over and makes all contracts for construction, repairs, alterations and improvements, and all work done in and about

the grounds and buildings of such institutions. The board may authorize the officer in charge of an institution to purchase materials and supplies not to exceed \$500 at one time, and to make necessary repairs not to exceed \$250 at one time. The method of making contracts by means of advertised bids is specified in detail. The only appointive power the board has except over its office force is in appointing a disbursing agent at each institution. The board may in its discretion purchase supplies over \$500 in amount for any State office, board, or commission. The board provides a uniform method of accounting and examines all books and accounts of the institutions at least once in six months, and controls the labor of prisoners. The chairman and secretary receive salary of \$3,000. The other members receive \$2,000 each.—*Acts*, 1912, Ch. 825, p. 187.

A Board of State Charities and Corrections of nine persons, three from Providence county, one from each of the other counties, and two from the State at large, has oversight, management, and control of six institutions located on the State farm at Cranston, appointing head officials and fixing all salaries. The board has executive functions concerning the binding out of pauper children, paroling and discharging inmates. Members receive no compensation.—*General Laws*, 1909, Ch. 360, p. 1332.

A board of seven, styled Board of Female Visitors or Women's Advisory Board, visits each institution where women are confined and reports to the General Assembly. It has no power to interfere in any way with the management of the institutions.—*General Laws*, 1909, Ch. 361, p. 1340.

**South Carolina.** South Carolina entered the ranks of the supervisory system in 1915 by creating a State Board of Charities and Corrections of five members. The duties of the board "shall be strictly visitorial and advisory without administrative or executive powers". It must visit, in whole or by committee, "inspect, and examine once a year or oftener, the State, county, municipal, and private institutions which are of an eleemosynary, charitable, correctional, or reformatory character, or which are for the care, custody, or training of the defective, dependent, delinquent, or criminal classes, except that the hospitals for the insane, the penitentiaries, and the reformatories shall be visited as often as once in six months". The Board inspects and reports upon the workings and results of chartered institutions or associations engaged in the care and protection of homeless, dependent, defective, and delinquent children or adults. Reports of inspections are sent to boards of supervisors of counties and councils of cities and to the officials in charge of the institutions. All plans for new jails, reformatories, and almshouses must be submitted to the board. The board appoints for each county or city a local committee of visitors of three persons, one a member of the local Board of Health, and one of whom may be a woman. The governor may ask for an investigation by the board of any institution receiving aid from the State, and the Board has full powers in carrying on the investigation. During such investigation the members receive a per diem of \$5. Otherwise the members receive no compensation, and are ineligible for the

position of paid secretary of the board while members or within twelve months of retirement from the board.—*Acts*, 1915, p. 132.

**South Dakota.** South Dakota belongs to the dual type. An administrative board, styled Board of Charities and Corrections, of five members, controls penitentiary, insane hospitals, schools for deaf, dumb, and blind, and the training schools. It has full power to examine the institutions financially and otherwise, to prescribe methods of management and manner of keeping accounts.—*Revised Code*, 1903, p. 34; *Civil Code*, § 171.

A board of three persons, styled Woman's Investigating Board, is a committee of investigation for the State institutions. It is its duty to visit at least twice a year each of these institutions, to inquire into and investigate the sanitary condition of each and the treatment and care of the inmates. Members serve for two years and receive a fee of \$3 a day for actual service.—*Civil Code*, 1903, § 307, p. 57.

**Tennessee.** Tennessee now belongs to the dual system. Prior to 1915 there was only a supervisory board, the Board of State Charities, which investigated the whole system of public charities and correctional institutions of the State, examined into conditions and management thereof, especially of prisons, jails, infirmaries, etc., and approved plans for new jails.

In 1915 there was created the Tennessee Board of Control, consisting of three electors of the State, one for each grand division thereof, to serve for six years. One member of the board is elected fiscal supervisor and one president. The latter receives a salary of \$4,000; the other members receive \$3,600. The board has full power to manage and govern nine State institutions; the school for the blind and for the deaf and dumb, three State hospitals for the insane, industrial school, reformatory for boys, and two State penitentiaries. It is given no power over other than State institutions. The act emphasizes efficiency of fiscal management, accounting and purchase of supplies, and in general follows the typical board of control law.—*Code*, 1896, § 2672, p. 638; *Public Acts*, 1915, p. 44, Ch. 20.

**Texas.** Texas is of the Iowa type in the penal field. A Board of Prison Commissioners, of three members, is vested with the exclusive management and control of the prison system of the State, and the care and treatment of prisoners. Each member receives a salary of \$300 per month, and must devote his entire time to the discharge of the duties of his office, and shall not engage in any other occupation or business during his term of office; nor shall any member be interested in contracts.

Texas has also a State Purchasing Agent over the State institutions for insane, deaf and dumb, blind, orphans, and the Confederate Home. In the strictly charitable field Texas is therefore somewhat of the Iowa type, since there is central control over one phase of the administration of charitable institutions. Each institution, however, is managed by a separate board of trustees.—*Laws*, 1899, Ch. 85, p. 138; *Laws*, 1909, p. 274; Vernon's *Sayles Texas Civil Statutes*, 1914, Vol. iv, § 7325, p. 4591; *Laws*, 1910, pp. 143-159; *General Laws*, 1913, p. 191.



**Utah.** Utah belongs to the trustee type. There is a board of corrections and a board of insanity, but they are merely boards of trustees for single institutions.—*Compiled Laws*, 1907, §§ 2155, 2220.

**Vermont.** Vermont belongs to the dual system. An ex officio Board of Visitors to State Institutions, consisting of the governor, lieutenant-governor, and speaker of the house of representatives, visits the prison, house of correction, industrial school, hospital for insane, and any private retreat or hospital for insane within the State; it examines regulations and general management and the treatment of prisoners. The governor may also appoint a woman on the board. A board of three Supervisors of Insane visits the Vermont State Hospital and the Brattleboro retreat, and any other hospital or place where insane are confined, and investigates the treatment of cases. It has the general supervision of insane not in confinement. A Board of Penal Institutions of three members supervises the State prison, house of correction, and industrial school, and inspects the discipline and sanitary conditions, etc.—*Public Statutes*, 1906, § 6017; *Laws*, 1910, p. 126; *Laws*, 1912, p. 170.

There is also a State purchasing agent appointed by the governor for two years at a salary of \$2,500. He contracts for and purchases all fuel, light, provisions, water, supplies, materials, and equipment for the use, management, maintenance and construction of new buildings for the hospital for the insane, prison, house of correction, industrial school, and State house, the normal and agricultural schools, and for any and all other buildings or institutions constructed, managed, and maintained by the State, and for all departments and officials. The New Hampshire and Vermont laws for purchasing agents are on the same plan.—*Laws*, 1912, p. 323.

**Virginia.** Virginia is of the Indiana type. A board of five persons, styled Board of Charities and Corrections, has strictly visitorial and advisory duties without administrative or executive powers; inspects and examines State, municipal, county, and private institutions which are of an eleemosynary, charitable, correctional, or reformatory character, or which are for the custody or training of defective, dependent, delinquent, or criminal classes. It also inspects chartered institutions, and approves plans for new jails, reformatories, etc. It appoints a committee of three local visitors for each county or city.—*Acts*, 1908, Ch. 276, p. 395.

**Washington.** Washington is of the Iowa type. A State Board of Control of three persons has full power to manage and govern State charitable institutions, has custody and control of State capitol buildings and grounds, annually visits State eleemosynary institutions, examines system of accounts and financial management generally, and has power to provide a uniform system of accounting. It supervises State tuberculosis hospitals. Members receive a salary of \$3,000.—*General Statutes*, 1909, §§ 8931-8956, p. 1989; *Laws*, 1913, p. 597.

**West Virginia.** West Virginia is of the Iowa type. A State Board of Control, of three members, has full power to manage, direct, control, and govern State charitable institutions except the educational. It has charge and control of the financial and business affairs of the State



university, State normal school, and branches, and colored institutes. The governor appoints superintendents. The board purchases all supplies by contract whenever possible. It may authorize the heads of the institutions to make purchases for small amounts. No member or officer of the board or of institutions shall be directly or indirectly interested in the purchase of supplies or contracts, and shall accept no gratuities from tradesmen. Members of the board shall give their entire time to the duties of their office and shall not be eligible to any other lucrative office in this State during the term of service for which they were appointed or for one year thereafter, or to any position in any institution during the term for which appointed nor within a year after the term has expired. Each member receives a salary of \$5,000.—*Acts*, 1909, Ch. 58, pp. 452-464.

**Wisconsin.** Wisconsin is of the Iowa type. A board of five persons, one a woman, styled State Board of Control, has fiscal and administrative control over charitable institutions of the State. The board inspects finances and administration of all other charitable institutions incorporated in the State as well as county and city institutions, and may condemn buildings dangerous to health. Members of the board receive a salary of \$2,500.—*Statutes*, 1913, Ch. 29, p. 329, §§ 561a-572a.

**Wyoming.** Wyoming is of the Iowa type. A State Board of Charities and Reform, consisting of the governor, secretary of State, State treasurer, State auditor, and State superintendent of public instruction, has general supervision and control of all such charitable, reformatory, and penal institutions as may be established and supported by the State; of all buildings of the same, including insane asylum, State penitentiary, deaf, dumb, and blind institutions, general hospital, soldiers' and sailors' home, but excepting State poor farm, and inspects these, except county jails and the poor farm. It directs the management and is responsible for funds. The Board of Control in Wyoming is not a charity board, but has the supervision of State waters.—*Compiled Statutes*, 1910, § 436, p. 187; § 761, p. 256.

There is also a State Commission on Prison Labor, which consists of the State Board of Charities and Reform and the warden of the State penitentiary. Its power is wholly over the employment of prisoners.—*Session Laws*, 1911, Ch. 61, p. 80.

## Appendix B. Personnel of Boards

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This table is designed to show the general range of provisions concerning the personnel of State boards. The eleven States and nineteen boards selected show at once both the general similarity which exists throughout the country in the treatment of boards of the same kind; that is, supervisory or administrative, and the great variety in the detailed provisions.

TABLE SHOWING PERSONNEL OF BOARDS

| STATE             | NAME OF BOARD                      | NUMBER OF MEMBERS | TERM OF YEARS           | COMPENSATION               | QUALIFICATIONS   |
|-------------------|------------------------------------|-------------------|-------------------------|----------------------------|--|
| Arizona .....     | Board of Control                   | 3                 | 2 for citizen member    | \$1,800 for citizen member | Auditor, governor ex officio, 1 citizen.                         |
| California .....  | Board of Charities and Corrections | 6                 | 4                       | .....                      | Not more than 3 of same party. Women may be appointed.           |
|                   | Commission on Lunacy               | 5                 | .....                   | .....                      | All ex officio.  |
|                   | Board of Control                   | 3                 | At pleasure of governor | \$4,000                    | None.  |
| Connecticut ..... | Board of Charities                 | 5                 | 4                       | .....                      | Two shall be women.  |
| Illinois .....    | Board of Administration            | 5                 | 6                       | \$6,000                    | Bipartisan.  |
|                   | Charities Commission               | 5                 | 5                       | .....                      | Not more than 3 of same party.                                   |
| Indiana .....     | Board of Charities                 | 6                 | 3                       | .....                      | Governor ex officio, 3 from each leading party. Women appointed. |
| Iowa .....        | Board of Control                   | 3                 | 6                       | \$3,000                    | Not more than 2 from same party.                                 |
| Kansas .....      | Board of Control                   | 3                 | 4                       | \$2,500                    | No 2 from same congressional district.                           |
|                   | Board of Corrections               | 3                 | 3                       | \$1,200                    | Not more than 2 of same party.                                   |

TABLE SHOWING PERSONNEL OF BOARDS—Continued

| STATE         | NAME OF BOARD                                  | NUMBER OF MEMBERS | TERM OF YEARS | COMPENSATION                                | QUALIFICATIONS  |
|---------------|--|-------------------|---------------|---|---|
| Massachusetts | Board of Charity Commission on Mental Diseases | 9                 | 5             | .....                                       | None.   |
|               |  | 5                 | 5             | \$7,500 for director only                   | Director and two others must be physicians and experts in insanity.                           |
|               | Board of Prison Commissioners                  | 5                 | 5             | \$4,000 for chairman only                   | Two shall be women.   |
| New York      | Board of Charities                             | 12                | 8             | \$10 per day; not to exceed \$500 per annum | One from each judicial district; 3 from New York.   |
|               | Fiscal Supervisor of Charitable Institutions   | 1                 | 5             | \$6,000                                     | None.   |
|               | State Commissioners of Prisons                 | 7                 | 4             | Same as Board of Charities                  | None.   |
|               | Commission of Lunacy                           | 3                 | 6             | \$7,500 for chairman; \$500 for others      | Mentioned in text. Experts required.  |
| Ohio          | Board on Administration                        | 4                 | 4             | \$5,000                                     | Not more than 2 of same party. Appointment based on experience and knowledge in charity work. |
| Wisconsin     | Board of Control                               | 5                 | 5             | \$2,500                                     | One a woman.  |



## Appendix C. Bibliography

There are three main sources upon which this study has been based: the statutes and constitutions of the various States; the reports of State boards; and the *Proceedings of the National Conference of Charities and Corrections*, 1876-1915. Reference to the statutes of each State has been made in Appendix A. Below is given a select list of the most pertinent articles in the *Proceedings* and of reports of State boards which are particularly significant for this study, together with other material utilized.

### State Boards and Systems (from *Proceedings*)

- 1881. The Utility of State Boards of Public Charity. G. S. Robinson (p. 58).
- 1882. The Proper Functions of Boards of State Charities and Corrections. Professor George I. Chase (p. 19). Discussion (p. 25).
- 1886. Report of Committee on State Boards of Charities. H. H. Giles (p. 19).
- 1887. Work Accomplished by the State Boards. F. B. Sanborn (p. 75). Discussion (pp. 266-274).
- 1889. Report of Committee on State Boards of Charities. H. Hastings Hart (p. 89).
- 1891. State Boards of Charities. Hon. M. D. Follet (p. 154). Discussion (pp. 369-374).
- 1892. Organization, Powers, and Duties of State Boards. William P. Letchworth (p. 13).
- 1894. The Value of State Boards. Levi L. Barbour (p. 9). Boards of Charities as Boards of Control. Gen. R. Brinkerhoff (p. 15).
- 1895. Boards of Control. Clarence Snyder (p. 37). Discussion (pp. 442-452).
- 1897. The Organization of State Charities. Dr. Fred W. Wines (pp. 163-167).
- 1898. The Spoils System. Hon. Carl Schurz (p. 247).
- 1899. Politics in Charitable and Correctional Institutions. Lucius B. Swift (p. 233).
- 1900. The Board of Control of Iowa (p. 173). State Boards of Charities (p. 182). Discussion (p. 438).
- 1902. Control and Supervision (p. 147). The Work in Iowa (p. 140). Discussion (p. 367).
- 1903. Discussion (pp. 508-512).
- 1904. Report of Committee on State Supervision and Administration (p. 167). Discussion (pp. 599, 601).
- 1905. Discussion (pp. 495-507).
- 1906. Efficiency in State Charitable and Correctional Institutions (p. 401). Discussion (p. 548).

1907. The Function of a State Board of Control. L. A. Rosing (p. 40). Discussion (pp. 45-51).  
 1908. Boards of State Charities and the People. Amos W. Butler (p. 43).  
 1909. Report of Committee on State Supervision and Administration (p. 397). Problem of State Supervision in Illinois. William G. Graves (p. 430).  
 1911. Fiscal Control of State Institutions. Henry C. Wright (p. 12).

### **Extent of State Supervision**

1899. Relation of State Boards of Charities to Child Caring Societies and Institutions. Hugh F. Fox (p. 384).  
 1902. State Supervision of Private Charities (p. 130). Private Institutions and Public Supervision (p. 136). Discussion (p. 367).  
 1903. Report of Committee on State Supervision and Administration (p. 358). County and Municipal Institutions. C. L. Stonaker (p. 373).  
 1904. Limits to State Control and Supervision. A. W. Clark (p. 180).  
 1905. What Has the Public a Right to Know about Public and Private Charities and How shall it Learn about them? Miss Francis Greely Curtis (p. 434). Committee's Report (p. 420).  
 1907. Report of Committee (p. 18). Necessary and Reasonable Powers of a State Board. W. R. Stewart (p. 23). State Supervision of Private Charitable Institutions (p. 78).  
 1908. Need of Supervision for both Public and Private Charities. Mrs. Kate W. Barrett (p. 30).  
 1909. Proper Division of Charitable Work between Public and Private Agencies. H. C. Bowman (p. 413). Private Charities with Supervision by a State Board. David F. Tilley (p. 425).  
 1910. State Supervision of County and Municipal Prisons and Homes for the Poor. Demarchus C. Brown (p. 303).  
 1912. Report of Committee (p. 63).

### **History of State Boards**

1893. Report of Committee (p. 33).  
 1900. Report of Committee (p. 167).

### **Reports of State Boards**

- California. State Board of Control, first biennial report, 1913. State Board of Charities and Corrections, biennial reports, 1906, 1910, 1914.  
 Connecticut. Board of Charities, 1913, 1914.  
 Illinois. Board of Administration, biennial report, 1914. Board of Public Charities, 1906, 1908, 1909. Charities Commission, 1910-12.  
 Indiana. Board of State Charities, 1905-14.  
 Iowa. Board of Control, 1901, 1905-14.  
 Kansas. Board of Control, 1912.  
 Kentucky. State Board of Control, 1906-13.  
 Maine. State Board of Charities and Corrections, 1913, 1914.  
 Massachusetts. State Board of Insanity, 1905-11. State Board of Charity, 1905-11.

- Michigan. State Board of Charities and Corrections, 1906-14.  
 Minnesota. State Board of Control, 1902-12.  
 Missouri. State Board of Charities and Corrections, 1910.  
 Montana. State Board of Charities and Reform, 1906.  
 North Carolina. Board of Public Charities, 1912.  
 New Hampshire. State Board of Charities and Corrections, 1910.  
 New Jersey. Department of Charities and Corrections, 1913.  
 New York. State Commission in Lunacy, 1905-09. State Board of Charities, 1905-10.  
 Ohio. Board of State Charities, 1905, 1907, 1913. Board of Administration, 1912, 1913.  
 Oklahoma. Commissioner of Charities and Corrections, 1911.  
 Oregon. State Board of Control, 1914.  
 Pennsylvania. Board of Public Charities and Committee on Lunacy, 1906, 1907, 1910-13.  
 Rhode Island. Board of State Charities and Corrections, 1869, 1913. Board of Control and Supply, 1912. School for Feeble-minded, 1901, 1902.  
 Virginia. State Board of Charities and Corrections, 1910-14.  
 Washington. State Board of Control, 1909-13.  
 West Virginia. State Board of Control, 1910-14.  
 Wisconsin. State Board of Control, 1908-12.

### **Bulletins of State Boards**

One source of information concerning charities which will be more and more fertile as time goes on is the bulletins which several State boards are now publishing at regular intervals. They contain papers read at State conferences and are usually more informing than the formal reports. Special articles of various sorts and minor reports which would otherwise not get into print are also published in this manner. Reference is made here to a few of such bulletins containing matter particularly pertinent to this discussion.

- Ohio. *Bulletin of Charities and Corrections*. Board of Control of State Institutions. W. P. Crumbacker. December, 1908. Central Board of Control. Dr. M. C. Eyman. February, 1910.  
 Kansas. *Semi-Annual Bulletin of the Kansas Charitable Institutions under the Board of Control*, April, 1908.  
 Illinois. *Bulletin of Charities Commission*, pp. 7-10; Office of Executive Secretary and its Relation to the Field of Charity, pp. 15-56. William C. Graves.

### **Governors' Messages**

The annual messages of all the governors in 1915 have also been studied in connection with this thesis. A complete list of significant recommendations in these messages, compiled by the writer, will be found in *Public Affairs Information Service, Annual Cumulative Bulletin*, 1915.

**Miscellaneous Material**

- Supervision and Education in Charity. J. R. Brackett.  
Development of Public Charities and Corrections in the State of Indiana, 1792-1910. Published by the State Board.  
Care of Destitute, Neglected, and Delinquent Children. Homer Folks. 1902.  
*Boston Medical and Surgical Journal*. Some Perils Confronting State Care of the Insane. Charles P. Bancroft. February 18, 1913.  
Illinois. Report of Efficiency and Economy Committee, 1915.  
Massachusetts. Message from the Governor, and Report on Reorganization of Boards and Commissions having Supervision and Control of State Institutions. Submitted by Commission on Economy and Efficiency, February 7, 1914. Report of Commission on Economy and Efficiency, April 15, 1914, concerning House Bill No. 2137.  
The Care of the Insane under State Boards of Control, New York. *State Hospital Bulletin*, Dr. Thomas W. Salmon, February, 1915.  
*Survey*. 22:553-554, July 17, 1909; 26:170, April 22, 1911; 26:314-318, May 20, 1911; 29:712-713, February 15, 1913; 36:119, April 29, 1916.  
Report of an Investigation of Methods of Fiscal Control of State Institutions, Henry C. Wright. Published by the New York State Charities Aid Association, 1911.



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